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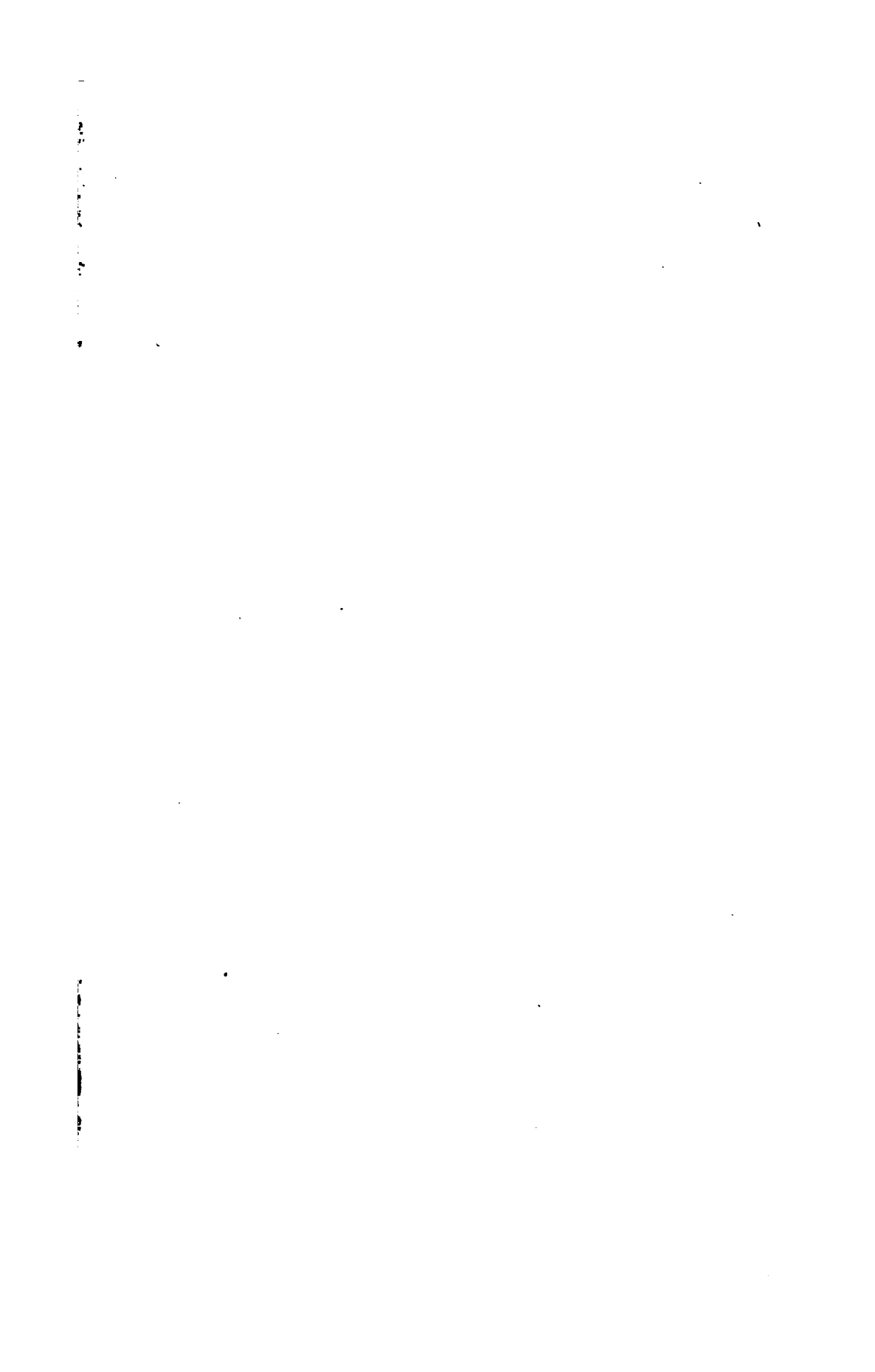
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THE
BRITISH
FARMER'S MAGAZINE.
NEW SERIES.

Agriculture not only gives riches to a nation, but the only riches she can call her own.—DR. JOHNSON.

VOL VII.



LONDON:
J. RIDGWAY & SONS, 160, PICCADILLY.
1843.

LIVERPOOL:
PRINTED BY J. F. CANNELL, 18, CASTLE STREET.

THE BRITISH
FARMER'S MAGAZINE,
New Series.

VOL. VII.

APRIL, 1843.

NO. XXV.

THE MANURES ADAPTED FOR DIFFERENT SOILS.

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The effort to increase the productiveness of the soil, by the application of manure, is, as I have elsewhere had occasion to remark, an attempt of very remote antiquity. We need only, indeed, trace the agricultural practice of even modern colonists, and of the possessors of some of the naturally fertile soils which are yet remaining unexhausted dispersed over the old world, to learn the origin of the use of manures, with what reluctance it was at first employed, and what strong efforts were made by the early tillers of the soil to avoid even the labour of carting it on to the land. The earliest records of its use, those in the Old Testament, merely indicate that the dung of animals was used as fuel. Water, in the oriental climates, was, in fact, the fertilizer—the weak liquid manure which the farmer most readily employed—with this, by narrow channels, he irrigated his fields, and even enriched his garden. In favourable, low situated lands, no fertilizer was so valuable to him as the water of the river: it cooled his land; it nourished his crops; but, above all, its application accorded with his oriental indolence; it was the only enricher which spread *itself* over his half-tilled fields.

VOL. VII, NEW SERIES, NO. XXV.

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In the more temperate climate of some portions of Europe, the cultivator long tilled only the richest soils of the district in which he located himself; and when, by over-cropping, and an equally wretched rotation of crops, he had exhausted that naturally favoured spot, he quietly removed to another, without making an effort to manure the soils his crops had exhausted. And even to this day, in some portions of Russia, the peasants are described as being still prejudiced against the employment of manure—a fact to which Mr. Murchison, in his paper on the “Tchornoi Zem,” or black earth of the central regions of Russia, thus briefly alludes—(*Jour. Royal Agr. Soc. Eng.* vol. 3, p. 129). “The ‘tchornoi zem’ is unquestionably the finest soil in Russia, whether for the production of wheat or grass. It is so fertile as arable land that the farmers never apply manure; and after taking many crops in succession, leave it fallow for a year or two, and then resume their scourging treatment. The natural productiveness of this soil has doubtless tended to confirm the prejudices of the peasants of central Russia against the use of manure, enormous piles of which, the accumulation of ages, are seen behind most villages and towns, forming, between the houses and the river below them, hillocks of considerable magnitude, the export of which might really prove a very beneficial trade to those countries more advanced in agriculture, and whose poorer soils are worthless without repeated dressings of manure. In the meantime, however, it is right to state, that the well-educated Russian proprietors of such lands in central Russia are now labouring hard to overcome the ignorance of their peasants, and have, in some instances, succeeded in inducing them to manure their fields; whilst in the northern governments, where the soil and climate are more adverse to the cultivator, improved agricultural habits are becoming prevalent; and in all the military and German colonies manure is regularly harrowed in, the culture being occasionally as clean as in some parts of western Europe.”

This neglect of manure is still more common in many of the half-cleared and worse cultivated lands of the new world. Thus a recent writer, when describing the soil of East Tennessee, remarks:—“White clover, rib-grass, and trefoil, are indigenous; red clover flourishes luxuriantly, and is coming into general use as an enricher of the soil; the majority of the farmers have been, and even yet are, too indolent to haul out the manure, so that about the old stables it is usual to find it from three to six feet deep.”

The natural course of events in all countries, however, alters sooner or later this state of slothful tillage. The increase of population first raises the value of corn, and such increased prices then tempt the

farmer to cultivate not only second but third-rate soils, and thence come the attempts to render these inferior lands more fertile by the addition of manure. Nature would here, too, be the cultivator's best guide, for he could hardly fail to notice, that around those spots on which the dung of his cattle was deposited, vegetation was the most rankly luxuriant. And again, as regards the application of earthy manures, which was naturally a much later agricultural improvement, the observation of the phenomena of nature could hardly fail to instruct the farmer very materially in this respect also. Wherever a stream, in leaving one stratum of earth deposited on another soil its mechanically suspended matters, there the increased luxuriance of the grass would clearly indicate the permanent advantage of the mixture of soils. It is in this way, in fact, that the naturally richest alluvial soils have been formed in the course of ages. Witness the lower portions of the extensive rich Valley of the Thames. The waters have there brought together, in the finest state of division, the chalk of Oxfordshire, the sands of Surrey, the clay of Middlesex; and these, thus mingled together, now constitute some of the richest soils of Kent and Essex.

The husbandman at length then began to imitate these processes of nature. Our Saxon forefathers, it appears, were, from a very early period, celebrated for their use of marl on the gravels of the south of England—(marl is a mixture of clay, chalk, and sand). The farmers of the west, in the days of our Norman kings, spread calcareous sand over the clays of Cornwall and Devonshire, just as they do at the present time. And in many portions of England there are rich luxuriant meads, resting upon peat, whose surface-soil has evidently, at some distant period, been formed by a mixture of earths brought from a distance.

In a recent number of the *Journal of the Royal Agricultural Society of England*, v. 3, p. 180, Mr. Pusey has very clearly sketched the objects and expense of the system of permanently improving poor soils, by improved drainage and by earthy mixtures; and his remarks are so very practical that they can hardly be too generally diffused. After having stated the advantages which can be derived by heavy soils from the more extensive use of drain tiles, and other modes of improved cultivation (and to such soils copious dressings with sand, chalk, or even burnt clay, are permanent fertilizers), he adds—"hitherto we have considered only one defect of land—too great cohesiveness, and consequent retention of too much moisture. There is an opposite fault, however, well known to farmers—too great looseness. This fault may be seen on tracts absolutely barren, as on Bagshot Heath, or on fields under culture, which are termed blowing sands; because the surface-sand drifts in high winds.

In different different degrees it is a common fault in land, and shows itself by thinness of the corn crop, shortness of the straw, and of the ear. Formerly, indeed, rye was grown on such land instead of wheat. Folding with sheep, pressing, and shallow ploughing, diminish the evil, but do not remedy it. The practice of our ancestors was to cover such land with marl, which is usually a strong clay, containing a great deal of lime. Marl was said indeed to benefit the land at first, but to injure it afterwards; to be "good for the father, but bad for the son." This injury, however, I believe, arose from improvidence. Marl was found to act without dung at first, and the fields which had been marled were, consequently, tilled without dung until their soil was completely exhausted. It fell into disrepute, and many farmers are perhaps not aware that it is still used largely in England. I have been surprised to find in the successive numbers of our *Journal* how often it is mentioned casually by the members of our society. To take first the most striking example—the improvement of the late Lord Leicester's property, as described by Lord Spencer (*Journal*, v. 3, p. 1.) I doubt if that lamented nobleman, with all his enterprize, could have fed oxen where rabbits had previously browsed, as was his just boast, unless those sandy commons had first been made solid with marl. It is used also largely in Bedfordshire, on a yellow sand about Woburn (*Journal*, v. 3, p. 233). The practice is general, I believe, in Norfolk, and also in Suffolk. It is mentioned by Mr. Dugdale as existing in Warwickshire (*Journal*, v. 2, p. 259).* And we have a good account of an entire farm which had been marled, at Sherriff Hutton, in Yorkshire. (In this experiment 150 tons per acre were spread at an expense of about 5s. 9d. Marl is commonly applied in Cheshire to light soils, at the rate of 128 cart-loads to the acre (*my work on Fertilizers*, p. 271). I have also had specimens of marl so used sent from the New Forest, in Hampshire. The greatest improvement of recent times is the application of clay to peat and peaty sand in Lincolnshire, and the wide district of the Fens; by which, in one instance, as we learn from Mr. Wingate (*Journal*, v. 2, p. 408), on land which had been almost worthless, two white crops had been grown every three years, one of them wheat, yielding 40 bushels per acre. An unexampled rotation, not

* In an experiment of this gentleman with spring wheat on a light gravelly soil, dressed with a coating of marl the previous autumn, the produce of $\frac{1}{4}$ of an acre was as follows:—

Soil marled.....	10 bush. 2 pecks.
————— and cubic petre, 1 cwt. per acre	13 „ 2 „
————— saltpetre 1 cwt. per acre.....	10 „ 2½ „

used, however, when the land was fresh, but continued for 18 years. This improvement, which equals anything that has been done in Flanders, is another instance of the same principle. It is therefore important to examine the facts accurately. As yet, however, we have not the means.

“The substance applied is sometimes called marl, sometimes clay. Of the specimens I have received, even those which were called clay, have generally turned out to be marl, for they contained carbonate of lime, or chalk, which constitutes the distinction. The difference, however, is important, because marl is a much rarer substance than clay; and if lime be an indispensable ingredient of clay fit for manure, many districts of England must be cut off from this source of improvement. I am inclined, however, to hope that it is not indispensable. One specimen of the Lincolnshire clay which I examined was certainly not a marl. Again, the Flemings, as Mr. Rham informs us (*Outlines of Flemish Husbandry*), have converted their sandy desert into one of the most fertile districts of Europe, by bringing up, year after year, two inches of subsoil from trenches shifted each year until they reached a depth of two feet. Their sands, I believe, rest often upon a yellow clay, and their fields have in some places the singular appearance of light sand on the surface, while water is standing in the ditches two feet below. I do not think that the clay of the Netherlands contains much lime. I have met with an instance of a strong clay without lime in Suffolk, which had been applied to a poor, light, calcareous soil, and paid itself the first year in the clover crop—(*Essay by Captain Alexander*). Near Reading, too, the same effect has been produced, by the clay dug out from the railway, on a thin, burning gravel: that clay is certainly not a marl. We have also a striking account (*Journal*, v. 3, p. 161) of the application of blue shale to a field of gravel, on which dung and bones had equally failed to produce either turnips or barley, yet 50 cart-loads of this shale brought, on each acre, 40 bushels of barley. Now shale is clay half hardened into blue slate. I do not know whether there was lime in the shale—probably not; but here is an answer to a question sometimes asked—Is clay better than dung? The answer is yes; for on a very light land even dung will not produce wheat, but clay will. And I may now give a case in point, which happened this year on my own land: a piece of barley containing twelve acres; the soil a poor, loose, peaty sand; when the blade appeared, one-half of the piece looked green and healthy, the other half yellow and sickly; on inquiry I found that to the thriving portion there had been applied two slight dressings of strong clay (not marl, for it had been examined), amount-

ing to only 50 loads on the acre; the boundary was distinct; but in the middle of the sickly portion was also a square patch of vigorous growth—here there had been a dunghill one year before. The result at harvest was this, that on the clayed portion there was a thick crop up to the boundary, and even where a detached heap of clay had been laid; on the unclayed portion the crop was thin, many of the plants having perished. An acre of each was fairly selected, and thrashed separately: the unclayed acre yielded $34\frac{1}{2}$ bushels of barley, the clayed acre 46 bushels; so that this lasting improvement of the soil was paid in the first year. Where the dunghill had been the barley ripened prematurely, was of a dark-brown colour, and the seed was shrivelled. It is commonly said by farmers on our burning land, that the better a field has been dressed in the previous winter, the worse will the barley be in a hot summer; and I see that they are right. This supports the remark of Mr. Handley, that manure will not benefit land beyond a certain point—will produce not wheat but straw. It is, I believe, a fundamental principle of agriculture, that each soil has a limit beyond which manure cannot force it, and the principle should never be left out of sight. I would add another rule. Strengthen the soil itself where you are able, and you raise that limit permanently. Corn, especially wheat, requires solidity in the soil. A principal cause of barrenness, as Mr. Rham has shown us, (*Journal*, v. 1, p. 47.) is coarseness of particles—I suppose because the rootlets are not in contact with such soil. Marl, I believe, does not act merely by its lime, but corrects this defect by interposing finer particles in the soil. Clay certainly acts in this way. It is remarkable that amongst the many analyses of soils reported by Dr. Liebig, all the fine, close sands are fertile, and the coarse, loose sands, with one exception only, are barren.

“But though clay may act which is not marl, and does not contain lime, there is no doubt that the lime contained in marl is also beneficial. In Mecklenburg sandy marl is used as well as clay marl. In the county of Suffolk there is a loose rubble called craig, now largely used by farmers as a dressing for land. The account of its discovery, in a Prize Essay of the East Suffolk Agricultural Society, is thus given by Captain Alexander:—‘I now come to the shelly deposit denominated red craig: it consists of shell mixed with sand and gravel. It is barren in its own nature, and is therefore used instead of gravel to form garden-walks; it contains much oxide of iron, and was first discovered to be useful as a stimulus to soils overcharged with sour, black, vegetable deposits from the following accident. A person was carting some of this craig for a garden-walk, and in conveying it over a black barren soil, the cart

broke down and scattered the contents; the driver, instead of collecting the craig, spread it over the surface where it lay. The field was after this prepared for turnips in the usual way, and much to the surprize of the occupier, there was a good crop of full-sized turnips where the craig had been cast, while the rest of the field afforded only a miserable crop of stunted growth. By this accident was the application of craig first made efficient, and it is almost impossible to calculate the increase added to our agricultural produce by this discovery in the craig districts.' Such," continues Mr. Pusey, "is the origin of a widely-spread provincial practice. On the same kind of loose earth my own neighbours have observed that where limestone rubble has lain, or a road has passed, the turnips are better, and they spread rubble on such land. Mr. Charnock not only applies clay to sand, but he adds, 'I have attempted to improve my farm by an admixture of soils, and have found it by far the most certain way of making permanent improvements. The calcareous (limestone) sand which in the neighbourhood has been considered perfectly poisonous to plants, I have found, by mixing liberally with the soil, to contribute to a considerable increase of my crop.'

"There is another ancient practice of the kind, which I mentioned in a former number—(*Journal*, v. 1, p. 1)—the application of chalk, brought up from pits dug 20 feet deep, on the chalk hills of Hampshire, and wheeled over the land in barrows, to the extent of 2000 bushels per acre; but I was mistaken in calling it an expensive operation, for the usual price is wonderfully low, only 45s. per acre. It is remarkable that the red clay of these hills, though very thin, and resting upon chalk, which is carbonate of lime, contains, so far as I can ascertain, no carbonate of lime at all. Hence the chalk acts probably in two ways: chemically, by supplying the lime which was wanting; mechanically, by loosening the clay, for its application renders these hills more mellow to work by the plough. Chalk, I find, is also used largely on the Wolds or chalk hills of Yorkshire, and there it is found to render loose soils more firm. This is a very cheap mode of transposing soils; but on the coast of Essex, where chalking is largely practised, it is brought by sea from Kent, and is applied at a rate of from 10 to 30 tons per acre, the poor lands requiring more than the rich; and in the clay districts of Windsor Forest the farmers sometimes bring chalk a distance of ten miles for the same purpose, at an expense, as Mr. Rham has told me, in his own case, of £8 per acre. If it is carted ten miles, where it costs £8, certainly not an acre of the hills themselves on which the chalk will act beneficially should remain without it, where it can be spread from the wheelbarrows for little more than £2 per acre."

It is most probably the calcareous, or shelly portion of the Suffolk red craig which renders it so valuable an addition to the soil. The calcareous sea sand of Cornwall and Devonshire owes a principal portion of its powers to the presence of 64 per cent of carbonate of lime. The value of this sand is so considerable to the western farmers that they are allowed to take it free of toll to the proprietors of the shore; and this privilege they enjoy under a grant from Richard, Duke of Cornwall; confirmed by another of the 45th of Henry III (1261), and by the statute 7, James I, c. 18, which declares in the preamble that this sand "has been found to be very profitable for the bettering of land, and especially for the increase of corn and tillage within the counties of Cornwall and Devon." But, as I have elsewhere remarked, this valuable use of sea sand is at present of necessity confined to the lands situated within a few miles of the sea shore; and yet, with this limit to its employment, the farmers in the neighbourhood of Padstow Harbour, according to Dr. Paris, convey annually about 54,000 single horse cart-loads of this calcareous sand from the shores of the bay. They carry it some miles into the country, not only in carts, but even on horses' backs. I have witnessed the same practice on the north shore of Devon. The farmers of that portion of England, in fact, feel that the great advantage of this, or any other mineral fertilizer, consists in the permanent additional fertility imparted by them to the soil; for the addition of sand, or chalk, or clay, to the field, they well know is not like the use of vegetable or animal manures—productive of benefit for one, two, three, or four years only, but that the increased fertility of a soil by such a dressing is observable for twenty years, or even longer, for it improves its very staple.

In claying his lands the farmer must not suppose that what is generally denominated clay, is exclusively alumina, for such is not the fact. What is commonly called clay is a mixture of alumina, sand, oxide of iron, carbonate of lime, &c. Some clay soil examined by Sir H. Davy, taken from a field at Sheffield Place, contained about 28 per cent of alumina. Another from West Drayton, 29 per cent.—(*Elem. Agri. Chem.*, 176.) Potters' clay contains only 33 per cent of the same earth. The rich soils of the Vale of Evesham contain about 15 per cent of alumina. The sands of Holkham, brought into cultivation by the talents of the late Lord Leicester, less than 1 per cent. Those of Bagshot Heath hardly a chemical trace.

The earthy or permanent manures, therefore, present no difficulty in our endeavours to understand the mode of their operation; for as all cultivated soils contain a mixture of sand, clay, and chalk, in an endless

variety of proportions, it is evident that the excess of any one gives the character to the soil, and hence arises the chalky, the clayey, and the sandy, or gravelly soils of the English farmer. It is this knowledge which suggests the remedy. Chalky soils are best permanently fertilized by clay, or marl; and either of these or chalk is an excellent addition to those lands where the sand is in excess. The cultivators of the clay districts, on the contrary, use chalk and sand, either calcareous or siliceous, as a dressing for their too adhesive soils.

In other districts, where the natural soil is peat, or even a mass of rounded stones of various sizes, totally unmixed with earth, there is but one course to pursue. The soil must be entirely formed, either by carrying it from a distance, or by digging it from pits in the very land whose surface-soil it is intended to form.

I rejoice to observe that the great advantage of thus permanently improving the soil by a mixture with earthy fertilizers is becoming more and more generally understood. In a recent page of the *Journal of the Agricultural Society*, (vol. 3, p. 233) the progress of this valuable practice, important even in a national point of view, is clearly described by two excellent Bedfordshire farmers:—"We find," says Mr. Burness of the Park Farm at Woburn, "the claying of our light soil of great advantage. It makes the straw much stronger, with a better ear, and standing much better up in wet seasons. My system has been to put the clay on the clover leys as early as the crop is off, and then to get it broken in pieces as much as possible before it is ploughed in for wheat; the quantity per acre is generally 50 loads. Nearly all the light soil on the farm of the Duke of Bedford at this place has been clayed, and a great deal of it twice, and in every instance we have found its beneficial effects." Mr. Pusey adds in a note "The clay employed contains a great deal of lime, and is, in fact, a stiff marl." In a succeeding page, when describing the practice on a farm of 630 acres at Maulden, Mr. Overman states that the soil of his land consists of "part gravel, part sand, part moorland covered with rushes, and some strong clay land"—of this he has clayed 420 acres—"upon the gravel and sand land I put 40 loads per acre (my carts hold 40 bushels); on the moorland 70 loads. I give my men 3d. per load to cart and fill, and they earn from 2s. 3d. to 2s. 6d. per day. I have both marl and clay on my land, and always test them by vinegar; if they effervesce I consider them good. Land will not always show the benefit it derives from clay in the first crop, which is the reason that it is condemned by some persons; others dread the expense, which, after all, is but little. I get the clay either directly after harvest or in the winter, if a frost, but I prefer the

former;" and when speaking of the application of chalk Mr. Overman remarks "I likewise have two trials that I have made with chalk on strong land, that always ploughed so badly that it was difficult to get the corn sufficiently covered to vegetate. I should say that I had to fetch the chalk six miles, rather an expensive job, but as they were small experiments I wanted to make, I did not take the expense into consideration; the result is, the land now works without difficulty; and I had an excellent crop of wheat on one of the spots. To sum up the benefits of clay to land in various ways, it is by correcting the acidity and giving solidity; by stiffening the straw, and increasing the quantity and quality of the corn; by preventing mildew, which this farm was always subject to, but which, since I have clayed, it has not been; by preventing the turnips from being diseased by graping (fingers and toes); and adding that to the soil which clover likes, more particularly the white or Dutch clover."

In some of those situations where earths of a suitable kind cannot be readily procured, it is a common practice to use the ashes obtained by the burning of peat, or to reduce the weight, and in some degree alter the mechanical properties of the clayey earths by the application of fire. The ashes procured from the burning of the peat obtained from those situations where it rests upon the chalk commonly contains from 10 to 12 per cent of sulphate of lime (gypsum). They are valuable therefore as a top-dressing for lucern, sainfoin, red clover, and, in a lesser degree, to turnips, because these crops contain sulphate of lime. It is therefore found to be an excellent top-dressing for these crops when growing on soils which do not contain this salt in sufficient proportions for the service of the crop; but still, in general, those soils in Berkshire and in Hampshire, which I have remarked to be the most benefited by its application, have been chiefly of the lighter kind—the sandy loams and the gravels. The peat-ashes of Flanders, whose employment is chiefly confined to the clover crop as a top-dressing, are extensively used on the sandy soils of that well and laboriously cultivated country.

The ashes procured by clay burning are commonly applied to clay soils, and in copious proportions. When the clay does not, as the makers of the ashes say, "burn into bricks," there is little doubt of its being an excellent fertilizer—more, however, from its mechanical, than its chemical effects. In many cases, too, where the claying of sandy soils is too expensive, from the distance of the clay from the field, the use of clay ashes will be found a very considerable advantage; for, by this process, all the water, &c., of the clay is driven off, and, in consequence, its weight materially reduced. In the experiments of M.

Schubler, sandy clay was found, when saturated, to contain 50 per cent of water; loamy clay, 50 per cent; stiff clay, or brick earth, 61 per cent; pure gray clay, 70 per cent; and white or pipe clay, 87 per cent.—*Jour. Roy. Ag. Soc.*, v. 1, p. 184.

The class of fertilizers next in importance, to be considered with regard to their applicability to different soils, are those of an organic nature; and in the consideration of these, considerable difficulties very frequently arise, owing to the varieties of soils and situations, and different qualities of the same manure with which the necessary trials have been made—questions which are much more necessary to be considered, even in the use of the richest organic substances, than many farmers are willing to believe. Yet it is certain that even the richest compost of the farm-yard varies in its beneficial results in many seasons, and on some soils produces results widely differing from its effects when used under different circumstances, and in other lands. Then, again, the compost of the farm-yard, every farmer is aware, varies very considerably in its effects, according to the food of the live stock by which it is produced. The manure, for instance, made in yards on which the bullocks are fed on oil-cake and Swede turnips, is of double the value of that made in the straw-yard. Every farmer in the east of England is aware of the superior value of the London, or corn-produced dung, to that which is collected from the farm-yard; and I have on several occasions witnessed on some of the black sands of Surrey, the strange difference maintained for years after in the appearance of portions of a field, on which, when the sheep were feeding off the turnips, they also had a supply of oil-cake.

It may be regarded as a pretty general rule, that most of the highly concentrated organic manures answer best on the lighter description of lands—soils through which the atmosphere more freely circulates than in the tough adhesive clays; and where, in consequence, the decomposition of these manures is more rapid and constant. It is thus that crushed bones, so admirable in their effects on the light turnip soils of the east of England, are found to produce little, or but slight good results on the clays and heavy loams. In such soils, too, the roots of the growing plants more readily penetrate to the gaseous and other matters of the decomposing manure. They are, consequently, more extensively absorbed by the crop: less escapes unemployed into the atmosphere. The same remark in general applies to other organic fertilizers commonly applied by the drill; to the urate of the London Manure Company; to the compost of M. Poittevin. They all (and it is perhaps a fortunate result for the farmer that they do so) produce superior results on the lightest, poorest upland soils.

It is worthy, too, of remark, that most of those organic manures which are celebrated in all quarters for their powerful effects, agree in one point at least—they all abound in phosphate of lime; the bones of the Lincolnshire and Nottinghamshire farmers; the sprats which enrich the soils of Essex, and the hop gardens of Kent; the guano of the Peruvian cultivators; the urate of the London Manure Company; the compost of M. Poittevin; the excrements of all animals feeding on animal food, abound in this very important salt.

It is noticeable, also, that these always require the presence of a certain degree of moisture in the soil to produce the maximum benefit. Hardly one of these well-known organic fertilizers seems to operate very successfully in dry seasons. The same remark applies to those abounding chiefly in animal matter; to the greaves of the tallow-chandler; and to the woollen rags of the Kent and Berkshire farmers. The Essex cultivators know very well, that in dry seasons the application of sprats (which yield abundance of oil) to their gravelly soils, does harm rather than good. The Norfolk farmers make the same remark with regard to the use of rape-cake. The late Lord Somerville and others did the same in trying whale-blubber on the sands of Surrey.

All these observations tend to prove the same fact, viz., that the regular access of the air and of moisture is essentially necessary to assist the decomposition of these organic manures, without which they cannot become the food of plants, (and this is another illustration of the advantages of deep and good ploughing). It may, perhaps, then, be concluded, that it is the closeness of the texture of the heavy clay soil, which, by retarding the access of both air and moisture to the organic manure in the soil, renders it difficult for the decomposition of these fertilizers to proceed with sufficient rapidity to materially benefit the crops for whose use they are applied. And that, moreover, such adhesive soils not only retard the necessary decomposition of the manure, but at the same time more powerfully resist the access to the decomposing substance of the roots of the growing crop. It is idle, however, to contend that heavy soils are not considerably benefited, sooner or later, by the application of these organic manures, for they are, and must be, enriched by the application; but then, it is equally true that such adhesive lands do not, in general, so speedily display the advantages of such application as those of a lighter, more porous description. It is a question, therefore, only of degree, and the best tilled clays are naturally those, which, from being the best pulverized, are the usual exceptions to the ordinary rule. This, I think, will be observed in taking a short view of the evidence which has been recently produced with regard to several of these fertilizers.

Guano is a manure entirely new to the soils of this country. Its name is derived, according to Humboldt, from the European mode of pronouncing the word "huanu," which, in the language of the Incas of Peru, intends manure or dung. And it appears that, so much valued was the guano in Peru, long before the Spaniards visited its shores, that the birds, whose dung deposited on the rocky islands of the Pacific Ocean constitute the guano, were protected by the laws of Peru, which also placed each guano-producing island under the care of an overseer, and assigned the produce to a particular Peruvian district. The land on which it is chiefly used in Peru for Indian corn, is described by Boussingault as of remarkable sterility, being a mixture of white sand and clay. It was used very successfully in 1810, at St. Helena, by the late General Beatson, for potatoes, mangel wurzel, and as a top-dressing for grass, on a rather stiff soil, being composed of blackish mould, intermixed with friable, fat clay.—(*Farmer's Encyclopædia*, p. 594.) In some experiments of Mr. Skirving, of Walton, near Liverpool, "on a poor, light, black soil inclining to peat," with Italian rye-grass, the results were as follows (*Journal*, v. 2, p. 304) :—

		Tons.	Cwts.	Lbs.
Guano, 3 cwt. per acre	produced	14	15	26
Nitrate of soda, 3 cwt. per acre	"	14	13	37
Farm-yard manure, 20 tons per acre	"	13	2	26
Soil simple	"	7	0	108

In the Isle of Man, Mr. Lyle tried it, at the rate of 3 cwt. per acre, on some grass land, "a light, poor, hungry soil."—(*Johnson & Shaw's Farmer's Almanac*, v. 1, p. 290.) Its use produced on a square yard of Stickney's rye-grass and small quantities of *holcus lanatus* and *poa trivialis*, 7½ lbs.; soil simple, 2¾ lbs. On the same space of Italian rye-grass, 10½ lbs.; on soil simple, 4¾ lbs.

Crushed bones appear to be chiefly useful as furnishing the phosphate of lime, an essential ingredient of most of the farmer's crops, especially the turnip; and it is worthy of remark, that no other crop is more generally benefited by the application of crushed bones than this. From hence, perhaps, is also to be derived one reason why crushed bones have been much more used in the turnip or light-land districts of England than in any others. For in almost every communication which I have received with regard to this fertilizer, the poorer light lands appear to have been chiefly benefited by its application, as on "the light, dry soils" of Middlesex—(*my work on Fertilizers*, p. 144). On those of Hertfordshire, "sandy, with a substratum of clay, and then chalk"—(*ibid*, p. 145). In Lincolnshire, its use, according to Mr. Broilsford, is "general over the greatest part of the county, and uni-

versal over the great natural divisions—the heath (corn-brash and upper oolite), the cliff and the wolds (the chalk and green sandstone measures of geologists)—(*ibid*, p. 147). The late Mr. Knight, of Downton, found it answered very well for turnips upon land “stiff and argillaceous”—(*ibid*, p. 151). In Cheshire, too, according to the Bishop of Norwich, “bones are used on every description of soil with the best results, provided the wet sands are first effectually drained”—(*ibid*, p. 158). On the estates belonging to his grace the Duke of Sutherland, at Trentham, in Staffordshire, bones have succeeded admirably on soils “of a light, dry, hungry nature,” both for turnips and grass leys—(*ibid*, p. 161). In the comparative trials of Mr. Sim, on barley, at Drummond, in Ross-shire, the following were the results produced on “a good, deep loam, on a gravelly subsoil very uniform in quality”—(*Journal*, v. 1, p. 418)—each Scotch acre equal to $1\frac{1}{4}$ statute :

Quantity applied per acre.		Produce per acre.		
		Qrs.	Bush.	Fzs.
Bone-dust	10 bushels dust	7	5	2
Farm-yard dung	18 double loads	8	1	1
Rape-dust	10 cwt.	7	3	0
Nitrate of soda	140 lbs.	7	5	0
Saltpetre	140 lbs.	6	2	0

On “a loam, with a clay subsoil,” at South Creake, in Norfolk, in the comparative experiments of Mr. I. Everitt, with Swede turnips, drilled at 27 inches on the ridges and 18 inches on the flat surface—(*Journal*, v. 2, p. 270) :—

		Produce per sq. rod, topped and tailed.	
		Stones.	Lbs.
9 loads of muck and 9 bushels of bones per acre	27 in..	13	10
Ditto ditto ditto	18 in..	13	10
Ditto and 9 bushels rape cake ditto	27 in..	14	12
Ditto ditto ditto	18 in..	15	6
20 bushels bones drilled between the ridges ditto	27 in..	13	12
16 bushels ditto drilled with the seed ditto	18 in..	14	4
20 bushels of rape cake ditto ditto	27 in..	14	6
16 bushels ditto ditto ditto	18 in..	13	8
8 loads muck, 9 bushels mixed bones and rape-cake	27 in..	14	4

According to the experiments of Dr. Madden, (*Trans. Hig. Soc.*, v. 14, p. 531) one ton of bone-dust is equal as regards—

Organic matter	1 ton of farm-yard dung.	
Soluble matter	1 ditto	ditto.
Easily dissolved matter	2·9 ditto	ditto.
Azote	3·9 ditto	ditto.
Saline matter	5 ditto	ditto.
Earthy phosphates	18·3 ditto	ditto.

The urate of the London Manure Company is, perhaps, nearly the most powerful and the most permanent in its effects of all the concentrated organic manures adapted for the drill. It appeared from the

trials of Mr. N. Taylor, of Old Rowney, to produce very considerable effects in promoting the growth of turnips upon "the sand lands" of Bedfordshire, and upon its "hot gravelly soils," according to Mr. Anderson, of Oakley, and Mr. Manning, of Elstow—(*Johnson and Shaw's Farmer's Almanac*, v. 1, p. 190)—by Mr. Franklin, of Cleminstone, in Glamorganshire, "on the mountain limestone on a stiff soil on the lias, and on a friable dark-coloured soil on the lias,"—in the same county, by Mr. Jenkins, of Flemingstone Court, "on a stiff loam upon the white limestone,"—and by Mr. Evans, of Clift, "upon a stiff loam, rather inclined upon a clay,"—upon "the light turnip soils" of Ridlington, in Rutlandshire, by Mr. E. Wortley,"—and on "the heavy clays" of Staplehurst, in Kent, for wheat, by Mr. Barnes. Its effects appear to continue to display themselves to an equal extent, on the succeeding crop of barley (*Ibid*, v. 1, p. 291).

In some comparative experiments with Swede turnips, in 1842, by Mr. Pusey, in Berkshire—"the soil a strong, but shallow loam, resting upon limestone," (*Jour. Roy. Ag. Soc. of England*, vol. 3, p. 424) the following results per acre were produced:—

	<i>Drilled at 18 inches.</i>				<i>At 27 inches.</i>		
	Tons.	cwts.	lbs.		Tons.	cwts.	lbs.
20 tons of dung produced	13	13	40	....	13	1	36
20 bushels of bones	14	0	36	....	9	18	40
26 bushels of Poittevin	13	1	40	....	12	1	48
3 cwts. of urate	12	5	80	....	12	5	80
3 cwts. of guano.....	13	10	16	....	12	3	16
20 bushels of peat ashes.....	8	16	0	....	10	16	60

Lance's carbon and humus are also very useful manures for the drill. The latter appears to have answered very well on the turnip soils of Brighteston, near Shiffnal, when used by Mr. Jellicoe. In some comparative experiments upon that crop he obtained the following results:—

	<i>Produce per acre.</i>				<i>Cost.</i>
Bone dust	18	15	2	.....	£5 8 0
Lance & Co.'s humus	25	10	1	.....	2 16 0
Gibbon's compost.. ..	16	12	0	.....	2 8 0
Fold-yard dung.....	32	3	0	.....	4 18 0

Clarke's desiccated compost is one of those fertilizers whose properties are, I believe, similar to that of Mr. Lance. It requires, in common with other dry concentrated manures, a certain degree of moisture to enable it to operate upon the crop with the maximum advantage; and hence, too, perhaps, arises the very widely differing statements which have been given of the effects of these enrichers in different counties and soils. I am not aware of any more recent trials with this compost than those which I shall add at the end of my observations on this class of fertilizers.

Poittevin's desiccated compost, which is a preparation of dried night-soil and calcined Thames mud, appears, like others of its class, to be productive of the most decided success on soils of a light friable description. Thus, it appears from the experiments of Mr. Miles, to have answered very well for turnips, "on a sandy loam on mountain limestone," at King's Weston, in Somersetshire.—(*Journal*, v. 1, p. 416.) But its effects do not appear to last more than one year.—(*Ibid*, v. 2, p. 266.) It failed to produce results as a manure for turnips equal to those of crushed bones, "on a strong soil, with a substratum of chalk;" in some experiments on the farm of Mr. Mason, at Atford, in Lincolnshire, and on "a heavy soil on a clay subsoil," at Lyndhurst, in Hampshire, Mr. Compton found its effects inferior to crushed bones, horse, cow, and sheep dung—(*ibid*, p. 269); but on "a field of sandy soil, with a substratum of sandy rock," belonging to Mr. Emperingham, of Salmonby, near Horncastle, more turnips per acre were produced from its use than by crushed bones; and "upon a field of sandy soil, on a thin, shelly rock," at Roxholm, near Sleaford, Mr. Graves obtained similar results.—*Ibid*, v. 2, p. 269.

In some recent comparative experiments suggested by the Council of the Royal Agricultural Society of England, on various organic drill manures, the results on different soils were as follows—(*Journal*, v. 3, p. 424):—

Soil and Place.	Manure. Per Acre.	Produce of Swede Turnips.			
		At 18 inches.		At 27 inches.	
		Tons	Cwt. lbs.	Tons	Cwt. lbs.
1. On a light sandy soil and subsoil gravel, at Lord Spencer's, Chapel Brampton, Northamptonshire ..	20 tons of dung.....	19	0	0.....19	0 40
	20 bush. bones.....	18	0	0.....19	10 80
	20 bush. Clarke's compost..	16	4	72.....17	16 88
2. On a light sand, substratum green sand, at Mr. T. Ferris's, Manningford, Bohn, Wiltshire	20 tons horse dung.....	11	5	48.....10	7 8
	20 bush. of bones.....	10	10	14.....10	11 88
	26 bush. of Poittevin.....	13	18	21.....11	13 10
3. On a freestone grit, at Mr. Bennett's, Pyt House, Wiltshire	20 tons of leaf dung.....	24	4	6.....19	1 0
	20 bush. bones.....	27	4	0.....19	1 0
	26 bush. Clarke's compost..	22	4	0.....16	18 2
	1 cwt. cubic petre } 10 bush. coal dust }	26	8	0.....20	3 0
4. On a clay soil, with a subsoil of chalk, at Mr. J. Stratton's, Manningfold Bruce, Wiltshire	20 tons horse dung.....	15	12	52....13	14 96
	20 bush. of bones.....	11	14	104....10	19 85
	20 bush. Poittevin.....	13	0	39....12	4 25
5. On a light sand, with a subsoil of green sand and sandstone, at the same place as No. 4	20 tons of pig dung.....	16	1	49....14	10 37
	20 bush. of bones.....	15	11	16....12	12 98
	26 bush. Poittevin.....	14	12	30....13	2 79
	26 bush. Clarke.....	14	1	22....12	1 0
6. On a sandy loam, upon a mountain limestone, by Mr. Miles, at King's Weston, in Gloucestershire	20 tons of dung.....	17	4	0....15	18 0
	20 bush. of bones.....	13	2	0....13	10 0
	26 bush. of Poittevin.....	10	8	0....12	0 0

The use of rape-cake as a manure is pretty accurately described in the Report of the Doncaster Agricultural Society, as being much more decided in its effects in wet, than in dry seasons, and as operating more beneficially on clays and other moist lands, than on dry soils. It has long, however, been successfully used as a drill manure for turnips by some of the best Norfolk farmers. Rape-cake has been recently analyzed by Dr. Madden, who found it to be composed of—(*Trans. High. Soc.*, v. 14, p. 529)—

Water	10.5
Organic matter	86.5
Earthy phosphates	3.0
Silicate of potash	1.0
	100.0

Bone-dust and farm-yard manure were also examined by Dr. Madden, whose scientific researches are ever seemingly directed in the right course—viz., to a practical application; and the following are the results, when placed in juxtaposition with rape-cake—(*Ibid*, p. 530.)

	<i>Bone-dust.</i>		<i>Rape-cake.</i>		<i>Farm-yard dung.</i>
Water	11.5	.....	10.5	.....	45.535
Total organic matter	33.5	.....	75.5	.....	33.565
Soluble matter	10.2	.....	29.5	.....	10.75
Easily dissolved matter	41.5	.....	41.7	.....	14.25
Earthy phosphates	55.0	.....	3.0	.....	3.0

One ton of rape-cake equals, as regards

Organic matter	2.2 tons of farm-yard dung.
Soluble matter	2.78 ditto ditto
Easily dissolved	2.9 ditto ditto
Azote	10.9 ditto ditto
Saline matter	.36 ditto ditto
Earthy phosphates	1.0 ditto ditto

Let us next observe the quality of the soils on which some of the experiments which have been published within these few years were made, with regard to various saline manures. And, first, with regard to saltpetre or nitrate of potash, one of the earliest salts mentioned as being grateful to vegetation. In the *Journal of the Roy. Ag. Soc. of England*, v. 1, p. 277, Mr. Kimberley, of Trotsworth, states the success of saltpetre “on sandy land of moderate quality,” for clover. At p. 281 of the same volume, Mr. Everitt, of North Creak, in Norfolk, in commenting upon the results of his own trials, observes—“As far as my limited experience enables me to form a judgment, I will venture to predict that, upon all light warm soils, it will be ultimately found to be beneficial as well as profitable; on the contrary, I have reason to

believe that on cold clay land, on an average of seasons, it will not more than repay the outlay. I give these opinions, not only from my own experience, but in accordance with the information I have collected from some extensive farmers, both upon light and strong lands, upon whose accuracy in ascertaining its results I can confidently rely." And again at p. 418, Mr. Sim, of Drummond, in Perthshire, notices its failure for barley and turnips, when tried "on a good deep loam, on a gravelly subsoil."

With cubic petre or nitrate of soda, the evidence as to the nature of the soil to which it is best adapted is rather discordant. Mr. Pusey remarks—(*Journal*, v. 1, p. 118)—"In this district (Pusey in Berkshire) the failures with nitrate of soda have occurred upon the light sands." It failed to produce benefit in the trials of Sir Robert Throckmorton, upon "light sheep pasture;" but it succeeded when applied to "two meadows resting upon clay." It failed for wheat on "a good sandy loam, upon stone brash, which had been for many years in a state of high cultivation, and had been three years in grass." Mr. Harris, of Hinton, also found on a farm "chiefly a free loam, that on one lot only was any visible effect whatever produced: this particular spot was pasture, consisting of a thin layer of sandy loam, upon a heavy clay."—(*Ibid*, p. 119.) In Mr. Pusey's own experiments with this salt as a top-dressing on some stone-brash land, with spring wheat, it failed to produce a good result; but in another trial, "on two wheat fields of twenty acres, the soil of which (the Oxford clay) is as strong and unmixed a clay as can be found," it succeeded very well, the outlay on the nitre being more than repaid by the increase of the crop—(on examining the wheat produced on different portions of this field, however, it was noted that 4 bushels of the seed from the portion with nitre yielded 241 lbs. of flour, but that 4 bushels without nitre produced 251 lbs.) "At present," well remarks Mr. Pusey, in conclusion, "the nitrate appears most capricious in its operation, but it is not, of course, Nature who is variable, but we who are ignorant."

Mr. Anderson, in Yorkshire, thinks "on strong land" it did harm to turnips.—(*Ibid*, p. 125.) At Aske, on a meadow, "a good loamy soil, well drained, with sandy stone and limestone below," it produced very good results. It appears also to answer very well on the chalk soils near Guilford, when used by Mr. Drewitt, who observes—"the chalk I cultivate is a very dry rubbly chalk, without any admixture of loam, and but little other mould; and on this soil it had no effect upon *turnips*, though for every other crop it was admirable." And he adds—"what is a curious circumstance, and rather gratifying, where it had no effect on the turnips last season, and where, of course they were in-

ferior, its effect on the succeeding crop of barley was very great; it was superior to any other part of the field.”—(*Journal*, v. 2, p. 127.) After considerable enquiry, Mr. Dewdney, of Dorking, in Surrey, is of opinion (*ibid*) “that on strong ground, or land in a high state of cultivation, it is dangerous to use it for wheat; there being a greater probability of the crop blighting”—but he commends its use “as a top-dressing on the Swede and turnip crops, particularly on light land.” Mr. Barclay, of Leatherhead, adds—“my farm is situated on the confines of the clay and chalk formations; the soil of the western part is mostly of a heavy description, with a subsoil of stiff clay. The experiments made on this portion, whether upon corn or grasses, have been unsuccessful; while those which have been made on the light lands, with chalk subsoil, have, with few exceptions, been attended with beneficial results.”—(*Journal*, v. 1, p. 130.) Mr. Burgess, of Missenden, in Buckinghamshire, “on stony thin land, with a substratum of chalk,” found it answered very well for barley, oats, wheat, grass, and turnips. (*Ibid*, 132.) “On a light stone brash, on a poor thin soil,” at Fairford, in Gloucestershire, Mr. Raymond Barker found that the white Hereford wheat yielded about a quarter per acre more, when dressed with this salt in February.—(*Ibid*, p. 133.) Mr. Grey, of Dilston, in Northumberland, thinks, from the result of his observations, that the soil has no influence in the matter, but rather that it is “a stimulus to the plants.” (*Ibid*, 135.) On the “light sandy soils,” of Brandon, in Suffolk, it was found by Mr. Wilson to answer in a very “satisfactory” manner for wheat—(*ibid*, 137); as it did in those of Mr. Greaves, of Bakewell, in Derbyshire, on “a heavy soil on a clay bottom,” and “on a light brown soil on limestone,” for oats—(*ibid*, 138); and in those of the Duke of Norfolk, with clover and wheat, at Farnham, in Suffolk, “on a poor, springy, sandy soil.”—(*Ibid*, 139.) In the comparative experiments of Mr. Dugdale, on “a stiff clayey field, manured with lime in the autumn,” the produce of half an acre of wheat was found to be, when manured with

	Bush. Pks.	
Nitrate of soda	18	1
Saltpetre	17	2
Soot	17	1
Lime only	16	0

Cubic petre failed upon the “sand, sandy loams, and crag subsoils” of Alderton, near Woodbridge, when used for lucern, beet-root, turnips, pease, barley, wheat, and white clover—(*ibid*, p. 260); and from the result of the trials of Mr. Newman, of Hayes, he concluded that this salt was only beneficial on land that was out of condition.

Common salt has been used on a variety of soils with varying success. It seems to produce the best effects upon the light upland districts considerably removed from the sea or the influence of its spray. I found it to produce, in my own experiments, very excellent effects upon the gravelly soils of Essex, both for wheat and potatoes. In the numerous and elaborate experiments upon Talavera wheat, by the late Mr. George Sinclair, it generally produced very good effects upon the light soils of Woburn, in Bedfordshire. He found it excellent for carrots when mixed with soot.—(*Essay on Salt*, p. 40.) It answered for wheat in Staffordshire, "on a strong loamy soil," in the trials of Mr. Belfield—(*ibid*, p. 45); and in those of Mr. Challis, of Panfield, in Essex, on a soil "loose and hollow;" but it failed "on land of a heavier description."—(*Ibid*, p. 46.) It succeeded at Heybridge, in Essex, on a "sandy clay"—(*ibid*, p. 48); and at Ingatestone, "on a rather heavy loam;" at Almond Myrehead, near Edinburgh, "on a sandy land."—(*Ibid*, p. 58) As a top-dressing for barley, on a "rich loamy soil," at Heybridge, in Essex; and in the trials of Mr. John Ransome, of Sproughton, in Suffolk, on "a light sandy soil;" on "a poor chalky soil," at Luton, near Chatham.—(*Ibid*, 64.) For potatoes I found it an excellent application, especially when mixed with pond earth, ditch scrapings, &c., on the Essex gravelly soils. The late Rev. Edmund Cartwright's experiments on "a ferruginous sand," at Tonbridge, in Kent, were equally satisfactory. Salt would seem to have the effect on the tenacious clay soils, when applied as a top-dressing, of case-hardening the surface; on some lands giving it the same appearance that an accidental flooding with sea-water imparts to the fields within its occasional reach. Marine salt—that is, salt made from sea-water—from its being the most deliquescent, appears to be the most preferable for sandy or other dry lands; and when common salt is decomposed by an admixture of twice its weight of lime, a salt is produced—the muriate of lime—which renders the mixture exceedingly deliquescent, and therefore still more suited to impart, or preserve, the moisture in sandy or gravelly lands.

Gypsum, or sulphate of lime, appears to answer equally well for the grasses which contain it on heavy and light soils (provided the soil does not naturally contain it). I have used it successfully for grass on the light gravelly soils of the Valley of the Kennett, near Hungerford.—(*Journal*, v. 2, p. 109.) Mr. Barnard, of Borden, in Hampshire, found it equally powerful in its effects upon sainfoin growing on a soil which he states to be "of a clayey nature, and would be very stiff but for the number of stones that are in it." Mr. Smith, of Highstead, in Kent,

applied it very successfully to a "poor chalk" soil—(*on Fertilizers*, p. 435); and in Canada, it appears, the farmers use it successfully "on sand, loam, and clay; but its effect is sooner visible on the sand"—(*ibid*, p. 446); and in the neighbourhood of Berlin it is also used upon the sands "too light to grow wheat"—(*ibid*, p. 449); in all cases, however, chiefly for the grasses.

From this brief survey of the results of a long-continued series of experimental researches, as to the particular soils to which various manures are the best adapted, the intelligent farmer will hardly fail to perceive that, although the evidence is often contradictory, yet that much valuable labour has been bestowed, and no inconsiderable harvest reaped, by many of the able cultivators who have been engaged in this most important inquiry. And it must not be forgotten, when we are thus compelled to make the acknowledgment, that although it is still difficult to show on which soil any particular fertilizer produces the most valuable effects, yet it is not difficult to prove very clearly, from the experiments of many considerable practical farmers who have assisted in the investigation, that there are few lands so unhappily situated, and not many soils so bad, but by some enricher or other they may be profitably enriched and brought into cultivation. And there is, happily, also another great truth still more and more rapidly diffusing amongst the noble cultivators of our islands, that there is much yet capable of being effected in increasing the productiveness of their lands, not merely by the use of decomposing manures which enrich but for a season or two, but by the employment of those earthy mixtures which, when judiciously employed, not only increase the profitable production of the land, but diminish the labour and other expenses of its cultivation for all succeeding ages.

CONDITION OF THE WILTSHIRE AGRICULTURAL LABOURERS.

[We extract the following able letter from the "Devizes and Wiltshire Gazette." The wholesome truths it contains present a striking contrast to the wilful fabrications of the untiring and vindictive enemies of the agriculturist; and we are glad the subject has been taken up by one who has done it justice. We only wish we could see his example more commonly followed. It really is unaccountable that our enlightened agriculturists will so silently receive the abuse that is daily poured out against them.]

SIR,—I have been a practical farmer for a great number of years. My father died at a good old age, and had been a farmer all his life; and nearly the whole of my connections follow the pursuit. I flatter myself I have thus obtained some knowledge of the science and of the details of

farming :—but I am not going to enter upon the question which has for a long period engrossed the attention of some of the ablest men in the country—viz., whether any, or if any, what amount of protection is necessary to *preserve* the agriculture of this country. I think I may, however, without presumption, request the favour of a short space in your paper to make a few observations as to matters of fact, relative to the agricultural labourers.

It has long been the fashion of a set of gentlemen, who arrogate to themselves the title of *Liberals*, to load the farmer with every sort of opprobrium, and particularly to hold him up as a hard-hearted master. Some year or two ago it was stated at a public meeting at *Southampton*, by two *most worthy* gentlemen of *Devizes*, who attended there as delegates, that, with the exception of potatoes, the labourers in North Wilts had no other food than black or rye bread. The falsehood appeared so monstrous at the time, that no one, I believe, took the trouble to contradict it. I am myself well acquainted with the food of the labourers in a large number of parishes; and I never even *heard* of a bit of black bread being introduced into any of their cottages. I have conversed, too, on the subject with several other farmers, and all of them declare to the same effect. I do not mean to say that throughout the whole of this division, such a thing might not have been seen; but I take upon myself *positively* to assert that it is not the food of the labourers. Then with regard to wages, about which there has been such an outcry. The *general* rate of wages in this part of the country is now 8s. a week.—“What! 8s. a week for a man, his wife, and 8 or 9 children?”—(methinks I hear the *Liberal* exclaim)—“Monstrous! That admission is enough for me;” and then he hops off. If, however, he would stop, and inquire but for one moment, he would find, that almost every member of an agricultural labourer’s family has employment provided, when he or she becomes of a certain age, and thus an addition is made to the total earnings. It is not unfrequent, indeed, that a family earn 25s. a week. Moreover, the agricultural labourer has advantages which the mechanic or town labourer does not possess. He has his cottage at a nominal rent, or at least for one-half its value: he has his potato land, which is ploughed, manured, and changed for him every year. He has fuel for a trifle; extra earnings at harvest and during the summer; leasings, which, in a good harvest, are considerable, and other privileges, which give him an advantage over the town labourer of 4s. a week. The farmer and his family also take an interest in him: he is not taken on in summer and discharged in winter, but although there is frequently not half work for him, he is continued throughout the year. This, Mr.

Editor, is the case with a large portion of the industrious agricultural labourers; and I will take upon myself to say, that at no period of our history was he better off, or his comforts more attended to than at the present moment. Yet it is among this class that the Anti-Corn-Law League are throwing their firebrands, and seeking to render them discontented with their employers; and thus to embitter their lives by making them bad servants and bad members of society.

Cases of distress will of course be found in every parish; but I am inclined to believe that in a great proportion of those cases, the sufferers have been the cause of their own distress. Misery is the natural attendant of drunkenness.

With regard to landlords, I believe that Wiltshire abounds with the most generous. I have the happiness to rent under as benevolent and as considerate a gentleman as the kingdom can produce; and when I mention his name, I am sure that you, Mr. Editor, will agree with me; I mean Mr. Sotheron. A better landlord does not exist; but although I have my farm at a moderate rental, I cannot, at the present depressed prices of agricultural produce, obtain any thing like remuneration for my capital and industry. Any further relaxation of the Corn Laws would therefore, in my opinion, involve the landlord, the farmer, and the labourer, in one common ruin. But whether this would be the effect or not, I cannot conceive that any one who has the real welfare of his fellow-creatures at heart, would seek to bring about that relaxation by setting the labourer against the farmer, and exciting both against the landlord.—I am, Mr. Editor, your very sincere friend,

A FARMER.

NEAR DEVIZES, Jan. 31, 1843.

THE FARM LEASES OF SCOTLAND.

SIR,

It has lately been the custom with certain writers, both in the British Farmer's Magazine and in other agricultural publications, when discussing the question of farm leases, to refer direct to Scotland, as a proof that to the leasing system of that country, the success of her agriculture is to be mainly attributed. But, while some are inclined to believe such is the case, many come to an opposite conclusion, and can bring forcible arguments to bear in support of their views: among the latter I find an Irish landlord, J. W. L. Naper, Esq., of Loughcrew. It appears that gentleman has recently published a pamphlet, entitled "Observations on the Elective Franchise and Fixity of Tenure, as con-

needed with Agricultural Improvement, addressed to the Landlords, Landholders, and Tenantry of Ireland ;" and the following extract from that work will not be considered valueless in the pages of a publication devoted to the improvement of agriculture :—

" When in Scotland, in the year 1811, thirty-one years ago, I observed that the farms not only in the Lothians, but in the neighbourhood of Perth and Glasgow, were let from £3 to £5 per acre ; so that *LONG BEFORE the existence of the present 19 years' leases, agriculture flourished in the lowlands of Scotland* ; and it may not be unfair to infer that these leases were as much the result of agricultural knowledge and improvement, as that they are now the means of continuing them. Having been, in the same year, on a visit to Dunrobin Castle, I saw the highland estates of the Marquis of Stafford and Lord Reay ; and I must beg to call the attention of Mr. Ford to an article in the *Quarterly Review* of March last, where he will see described the improved condition of those estates, now the property of the Duke of Sutherland, containing about 1,500,000 acres. By Mr. Locke's account, a far more rapid improvement has taken place in this princely property in Sutherlandshire, than that which Mr. Gregg has detailed of the Lothians. Yet who will say that these improvements could have been effected, had a legal fixity of tenure been forced on Scotland, during the last 28 or 30 years ? I am at a loss to see how, with reference to Scotland, Mr. Ford has proved that such a tenure as he advocates is the basis of their agricultural improvement."

I offer no comment on the above facts. Your readers will doubtless be able to come to a conclusion without any of my theorizing ; therefore, to them I leave it.

I am, Sir, yours, &c.,

A. B.

Feb. 8, 1843.

Advice to Small Farmers.—At a recent meeting in Dublin, Mr. Smith of Deanston observed " that nothing struck him more forcibly, in travelling through Ireland, than *the absence of turnip fields*. If small farmers, instead of sowing an acre of potatoes, would place only two-thirds of it under potatoes, and the remainder under turnips, they would, by the increased manure they would thus acquire, have, in a short time, more potatoes on the smaller portion of the land than they had before on the entire."

ON THE LIMITED APPLICATION OF CHEMISTRY TO AGRICULTURE.

SIR,

There is now a mighty stir in the country; anti-corn-law leagues, county, city, town, and hamlet meetings, all in violent opposition to the commercial restrictions on the trade of the empire. In this turmoil and intended revolution, the agricultural interest is seriously involved, and there is every sign of farm produce being considerably and permanently reduced in value, and the affairs of farmers under existing engagements being seriously embarrassed thereby. This result is confidently expected by all persons who are not farmers, by a great majority of farmers themselves, and by very many of their landlords. This change of circumstances has been long in prospect; and the landlords in general have been devising means by which their tenants may, by increasing their products, be enabled to withstand the impending depression.

Science has been invoked to lend assistance; because there is a prevailing idea, that, if applied to agriculture, the most important consequences would ensue. Engage the chemist to enlighten farmers relative to the real nature of the food of plants, and knowing this he will then be able to provide and apply it in all cases to his advantage. This is the opinion and the declaration of all those who entertain the idea that a knowledge of chemistry would be useful to the practical farmer. Ever since the publication of the late Sir Humphrey Davy's Lectures on Agricultural Chemistry, a growing opinion has been entertained of the truth and value of his discoveries; and of late a Professor Liebig, a celebrated chemist and vegetable physiologist, has been invited to explain, extend, and enforce upon practical agriculturists, the doctrine of Davy and other chemists; and this he has done with very great credit to himself. Nor has he laboured alone, several other professional chemists have enlisted themselves in the same cause. Johnston, Madden, Daubeny, Towers, Squarey, &c., have all employed their pens in diffusing a knowledge of their science, with the sole view of making it useful to cultivators.

It is quite true that there are many incidents and effects which occur in the culture of land which the cultivator cannot readily explain, nor can he have a right idea of them, unless he have some little knowledge of chemistry. That excellent science has not only discovered the elements of which plants are composed, but has also detected the same simple bodies in the earth, and air, and light, which being attracted or inhaled by living plants, serve to enlarge their several parts, and bring

them to perfection. These nutritive bodies mostly exist in a state of gas; that is, a spirit which cannot be coagulated; and are combined with water or with various other substances which we call manure. A little earth has been detected in the ashes of vegetables; but whether this be taken in by the roots, or received accidentally from the air, is not, perhaps, clearly ascertained.

This elemental food of plants is organizable; that is, when received in the plant, it becomes assimilated to the organic structure of the same, which is thereby amplified and completed.

Such are the discoveries of chemistry; besides which, it has supplied us with the names of those æriform or aqueous bodies which are so essentially necessary to vegetation, and so well explained in the catechism of chemistry written by your useful and respectable correspondent, Mr. Towers.

A question naturally occurs—How far, then, have the expectations of the friends of farmers been realized, by thus calling to their assistance the science of chemistry? It may be answered, that the analyzation of soils by a sort of public officary has been instituted, by whom any kind of soil may be tested, and its component parts and qualities relative to its fertility exhibited for the information of every inquirer. So all substances recommended as manures may be analyzed before incurring the expense or trouble of using them. And this branch of the science may be useful in many cases of practical husbandry. A farmer may have on his farm or within his reach, chalk, limestone, marl, sand, clay, and various other kinds of earth, which he may feel disposed to try as a profitable dressing to his land; but supposing him ignorant of what is already present in his soil, and also of the peculiar qualities of the mineral at his disposal, a safe preliminary would be to have them both analyzed by the chemist, lest he should be adding what is not wanted, or neutralizing that which would be for his interest to retain in full force. In such cases the assistance of the chemist would be highly serviceable, whether the cultivator have in view the enriching, amelioration, or consolidation of his staple. In such matters, although the practical farmer rarely falls into error, yet, in addition to his experience, if he had a smattering of chemical knowledge, it would not only be a mental but a real practical advantage.

In no particular has the chemist done more positive service to the farmer than pointing out to him his mismanagement of farm or fold-yard manure. This mismanagement chiefly consists in allowing, year after year, the invaluable drainage from the dung-heaps to escape into the nearest ditch or horse-pond. There is no farmer but knows that

this is wrong; but few have any idea of the extent of this loss. An ingenious writer has made a calculation, from which it appears that above *one-third* of the whole manure made on a farm is inevitably lost, either through carelessness or ignorance! Such instances of neglect by the English farmer are contrasted with the great industry and care of our neighbours the Flemish and other German farmers, who save every drop of their domestic and yard drainage for carrying upon their land; and also with the Chinese husbandmen, who save every particle of those matters which in England are consigned to the vaults and to the sewers. Although in such matters the farmer is well aware of what he should do, yet if he can be prompted to do his duty to himself by the reiterated and incessant advice and remonstrances of the chemist, the latter will be ranked as one of the principal benefactors of his country.

There are now in the market many different descriptions of artificial manures. These have either been invented or recommended by chemists after their properties have been investigated. The inventors sought to concentrate the organizable nutrition of plants usually found in those substances commonly used as manures, into the smallest possible bulk, in order to abridge the labour and lighten the expense of applying such bulky and heavy materials. In some cases they have succeeded admirably, not only in concentrating nutritive qualities, but in preparing them for use in a state of powder, in which they can be laid in with the seed in drills or otherwise, which is of great advantage to the plants, by lending sufficient assistance in the first stage of their growth.

Guano—the droppings of sea birds, which have been accumulating for ages upon the rocks on the islands and shores of South America—has been long used as manure in that country, and has now become an article of commerce in the port of Liverpool, and is found to answer the purpose of both importers and purchasers. Even this has been imitated with success, and artificial guano can now be purchased in any quantity. There is also desiccated night-soil, urates, and several other compositions recommended to farmers as powerful fertilizers, and which many have availed themselves of without disappointment. These have all been compounded at the instance of chemists; and, in conclusion, it may be affirmed that it is only in this branch of a farmer's business, namely, in the preparation and management of manures, that a knowledge of chemistry can be of any use to him.

M.

ON LIEBIG'S THEORY OF AMMONIA BEING AN ESSENTIAL INGREDIENT IN THE FOOD OF PLANTS.

The acquisition of knowledge must be progressive, and therefore, with a people like the British, the announcement of a new discovery can scarcely surprise; but the discovery of the extraordinary effects of ammonia as an essential ingredient in the food of plants, as described by Liebig, cannot fail to surprise many who have attended to horticultural chemistry: for, if ammonia be, as he asserts, so essential to the sustenance of plants, how did it happen that it escaped the observation of most, if not all, of those eminent men, both chemists and physiologists, who preceded this gentleman, as writers on those subjects? Having, for upwards of fifty years, amused myself as an experimental gardener, and very attentively watched the effect of different substances in various states of preparation, supplied as food to plants, and looked to Parkes, Thompson, Kirwan, Davy, Cooper, and others, as my chemical guides, I concluded, not only that nitrogen was not an essential in the food of plants generally, but that when nitrogen was taken up with its food, by some plants, it operated as poison to them. At any rate, then, before I wholly surrender my trust in the abilities and truth of my former teachers, and admit that their, and my own, conclusions were fallacies, I must beg to be allowed to request my horticultural and agricultural friends to pause a little before they allow those assumed and more modern authorities to put us all aside as fallacious theorists; and consider a little the results of practical experience, before they give up an old practice for a new quackery. It is not an unusual occurrence in this country for public opinion to have been forcibly seized upon and drawn into a vortex, by what is called authority, and which led to disappointment; therefore it behoves us to consider what the authority is before we submit entirely to its dictates. Lately, upon offering some observations on Liebig to the editor of a weekly journal, who precedes his name with a *Dr.*, and follows it with a long train of capital letters, I was shortly told, that, as I was not a professed chemist, I was not qualified to comment on the conclusions of Liebig; and, therefore, my observations were mutilated, and the principal parts rejected: but, although not a professor, my abilities or qualifications having been acknowledged, and submitted to by Sir Humphrey Davy, I do not feel inclined to remain silent at this gentleman's bidding. Show me the professor who, as an advocate for truth, has never attempted to impose an absurd supposition on the public as a scientific principle, and I will

acknowledge his authority; but I cannot acknowledge that professor of botany who will assert that that part of a vegetable which forms its generative organs is nothing more than a stunted branch*—nor the chemist who will assert that plants are supplied with the carbon requisite for their sustenance by and through the leaves†—to be authorities to which all ought to bow without inquiry.

In referring to my former essay on the "Food of Plants," it will be found that the principles I there explained will pretty clearly account for the various opinions of the qualities of Daniell's compost, guano, &c., as fertilizers of the soil; and the following observations will also justify the conclusion, that, even allowing it the value claimed, ammonia, in its application to agriculture, is but little different to a quack medicine.

It is said by the chemists that gluten, which forms about one-sixth part of the flour of wheat, contains about one part of azote or nitrogen to eighteen parts of the other elements; and hence it is concluded, that the addition of ammonia to a soil must increase its produce in wheat. But let us see how far this accords with actual results? Every chemist knows, that by the addition of lime to any putrescent substance, the azote is expelled in the form of ammonia; then how is this to be reconciled to the use of lime as a dressing for wheat? It may be said, that although lime has been used very generally, but few understand the principles of its operation. Thus, on walking over his farm with an eminent farmer in Devonshire, I, observing a quantity of lime collected as a dressing for a wheat crop, asked him how he expected it would operate to his benefit? He said he did not know; it was generally considered to be beneficial, and therefore he did as others did. I then recommended to him, as the best means of informing himself, to leave a strip across the field without lime: this he did, and he informed me that that part which was without lime produced the largest quantity of straw, &c.; but the sample of the grain of the limed part was evidently superior to the other. About this time I also made the following experiments in my garden: I took for my soil some vegetable mould, the result of leaves washed into a hollow and forming a bog, and which had been exposed to the sun and the air, in a dry situation, for upwards of twelve months; to a portion of this mould I added a fourth of slaked lime; to another portion I added a fourth part of limestone pulverized, not burned; to another I added some soda; and having filled a garden pot, of the same size, with each mixture, and one with mould alone, I transplanted into each a plant of wheat, and plunged the pots into the

* Lindley.

† Liebig.

earth, side by side, where they remained until the grain was ripe ; I then carefully collected and compared the produce, and found that of the plant in the pot which had the soda to be twice as much as those with lime and limestone (those two being about equal), and four times as much as that which had the mould alone ; but it was clearly obvious, that the grain of that produced by the quick lime was superior in quality to the others, that is, the grain was plumper or better filled, the skin thinner and more transparent.

It is also stated by the advocates of Liebig's doctrines, that it is well known that soot, as a dressing to a soil, naturally benefits a wheat crop ; and that ammoniacal gas liquor does the same ; but admitting this to be true, may not the additional fertility be accounted for by the addition of the soluble carbon contained in those substances ? I am convinced that carbon, soluble in water, forms the grand pabulum of plants, and that it is by adding this to a soil, or supplying some substance, and placing it under such circumstances, that will render the carbonaceous matter already contained in the soil soluble in water, that we can, by any art or labour, render a soil more fertile in its productions of vegetables. I am also convinced that food may be supplied to plants, in such different states, as to be wholesome or unwholesome ; that is, it may be productive of disease as well as of health, and of sterility as well as prolificacy.

H.

SCOTCH FARMING IN ENGLAND.

BY JOSHUA TRIMMER, F.G.S., &c.

The pamphlet by Mr. Gregg on Scotch Farming in the Lothians, having appeared at a favourable juncture, has attracted much attention. It has drawn upon him, as might have been expected, the fire of a host of assailants, who deny the superiority of the agriculture of the north over that of the south, and consider their own country, parish, or farm, better cultivated than any other in the world. I do not come forward to defend him against these assailants—he is very well able to defend himself. Coinciding in most of Mr. Gregg's conclusions, I found my preference of the agriculture of Scotland, in which I include that of the English border, not on his statements, but on the evidence given before the Agricultural Committee of 1836, and on an experience of more than twelve years in the management of a large farm in England, under a modification of the Scotch system.

The author of one reply to Mr. Gregg* states that the superiority of the Scotch practice, as described by him, appears to consist merely in the "noble expedient of ploughing up the potatoes, underfeeding the horses, and milking the cows three times a day, instead of twice." With submission to this writer, I contend, that it consists in the adoption of the following points of management, any of which may be transplanted into the south, without the others. The combination of them constitutes the Scotch system.

1. The two-horse ploughs and the cultivation of turnips in ridges, with the dung immediately under them. I shall reserve my remarks on these points for the last, as they will be the longest.

2. The thrashing-mill, in perfection, with water or steam for the motive power, is peculiar to the north. The prejudices of labourers and farmers, and of some others who ought to know better, will, for a long time, retard its establishment in the south. By the farmers of the north this is considered the most beneficial application of machinery which has been made to agriculture. Its advantages consist, not only in the cheapness at which it performs the work of thrashing, but in the entire command it gives the farmer over his crop, both as regards the securing of it in a wet season, when it would be apt to spoil in the stack, and as regards the power it affords of taking advantage of a temporary advance in the market. It turns out the corn, too, in better condition than hand-thrashing, and secures it from the pilfering and the depredations of vermin which take place during the slow process of separation by the flail. The following is the evidence of Mr. Robert Hope on the subject of the thrashing-mill:—

"Do you employ thrashing-mills? Yes; every farmer in the county has a thrashing-mill.

"Are those thrashing-mills worked by water, or by horses, or by steam? They are getting rapidly to be worked by steam; I think there are about 63 or 64 steam-engines in the county.

"What is the first cost of one of these steam thrashing-mills? A high-pressure of six-horse power, such as I have, of the best construction, is £145.

"What quantity of corn will it thrash out per day? We can easily thrash 30 quarters of wheat; I reckon that we can thrash 24 bushels an hour of wheat, and 40 bushels of other grain.

"What is the consumption of coal per hour to feed the engine? A ton for 10 hours.

* Observations on a pamphlet entitled "*Scotch Farming in the Lothians*," by R. H. Gregg. By H. Davis, Esq.

"At what price do you purchase it per ton? It is at various prices. I can purchase coal at present for the engine at 1s. 6d. to 2s. the ton. It is an inferior kind of coal, that is, at the coal-pit.

"What does it cost you at home? At the most it is not exceeding 8s. a ton, valuing the full price of labour for the hire of a cart.

"Have you experienced a great saving in consequence of the employment of the thrashing-machine? Yes, we consider it a very great advantage.

"How much a quarter do you save by it? I reckon the expense of thrashing does not exceed 1s. a quarter for wheat, and from 8d. to 9d. for other grain; that includes carting the corn and carrying off the straw, and fanning the corn to a certain extent.

"Does that include all the labour of feeding and watching the engine? Yes, and coal.

"Does it include interest upon the prime cost of the thrashing-machine? It would even allow a small per centage on that."

3. The Scotch excel in the compactness, convenience, and central position of their farm-buildings, by which labour is economized in the harvesting of the crops, the carrying out of the manure, and the supplying of fodder and turnips to the stock. These are points but little attended to in the south.

4. The Scotch study economy in the division of labour, by means of which, while an improved system of cultivation is adopted, combining the grazing and fattening of stock with arable culture, the two departments are separated, and the stock-keeper and the arable-farmer are each enabled to concentrate his energies in one point. The latter makes it his business to raise the largest possible crops in the most economical manner, selling his turnips and grass to the former, whose business it is to attend fairs and markets, watching their turn, and availing himself of the most favourable moments for buying and selling. This system, likewise, enables large farms to be cultivated by men possessing less capital than would otherwise be necessary. It combines all the advantages of a partnership without its inconveniences.

5. If the system of frequent drains and subsoil ploughing did not originate in Scotland, the practices remained local, insulated, buried in obscurity, or tried for a time and then abandoned. Mr. Smith of Deanstone, not a farmer but a manufacturer, has the merit of having reduced them to system and of having given them publicity.

6. The point of Scotch practice most strongly to be urged on the attention of the English farmers and landowners, at the present moment, is the system of corn-rents, recently adopted, as a protection to the

tenant under a fall of prices, and the long-established custom of employing, as labourers, hired householders resident on the farm, and paid all but a small portion of their wages in kind. These points of practice have been so fully treated of in this journal of late, that it is needless to say more about them than that they carried the tenants through the late period of agricultural distress, and rendered them satisfied with 40s. or 50s. the quarter for wheat, while the majority of the English witnesses before the committee talked of nothing but insolvency, and fixed 60s. as the minimum price which would yield the farmer a profit; and one, Mr. William Umbers—let his name be immortalized—was decidedly of opinion that it could not be grown even at 64s. with a profit, and proposed a protecting duty of 30s. the quarter!

“The most interesting as well as instructive portion of the evidence taken before the committee,” says Mr. Hutt, “whether it be considered singly or in connection with the rest, is that tendered by the agriculturists of Scotland. The contrast exhibited in the state and prospects of the farmer on different sides of the Tweed is, perhaps, as striking a phenomenon as the progress of society ever simultaneously developed. While the English farmer, in spite of exertions, is too frequently keeping up a difficult struggle with loss and insolvency, looking despondingly to the future, and like most men who are suffering, irritable, and in a temper to listen too much to any quackery that promises immediate relief; while this is the condition of the English farmer, his Scotch neighbour is conducting his affairs with high spirit, and with great success. In a country less favoured by soil and climate, he is farming to a profit, and actually in many instances paying not only a higher rent (in which I include local burthens in each country), but carrying on a more expensive cultivation, with reference to the quality of his land, than most Englishmen would undertake. Instead of tasking the omnipotence of parliament to assist him, he boldly declares that he only desires to be let alone, or if in any case he refers to legislative interference, it is that he may be less encumbered by those protective laws which afford a fictitious and dangerous monopoly to agriculture.”

Rents and labour paid in kind, so as to fluctuate with the fluctuations in the price of produce, would be less necessary, if the assailant of Mr. Gregg, to whom we have before alluded, could establish the point aimed at in a pamphlet published by him in 1839.* His views, he tells us, are not those entertained by farmers; but he recommends, that “however

* “The Effects of the Importation of Wheat upon the Profits of Farming, addressed to Agriculturists. By Hewitt Davis, Land-agent.” Second Edition. 1839.

opposed in theory every agriculturist may be who reads this work, he will at least try it by the proper and simple test, viz., by taking the gross amount of his expenditure for one year, and then trying if the deduction of $7\frac{1}{2}$ per cent, from the amount of his wages, would not compensate for a reduction of 12s. the quarter on the price of his wheat." The mode in which our author applies the test to his own farming expenses is the following:—

"An Account to show the annual Profit and Loss from a decline of 20 per cent in the value of Wheat on a farm of 1000 acres.

Dr.	Loss.	£	s.	d.
"Loss on 375 quarters of wheat, the produce of 150 acres beyond the seed sown, at 12s. per quarter.....				
		225	0	0
Cr.	GAIN.	£	s.	d.
"Saving in wages, by a decline of $7\frac{1}{2}$ per cent on the gross expenditure of £2000.....				
		150	0	0
Ditto in parish rates, by reduced price of bread, $7\frac{1}{2}$ per cent on £200				
		15	0	0
Ditto in tradespeople's bills, viz., sawyers, carpenters, bricklayers, wheelers, collar-makers, smiths, &c., $7\frac{1}{2}$ per cent..				
		15	0	0
Ditto in cost of flour consumed by my family, 20 per cent on £50				
		10	0	0
Ditto in cost of clothing, furniture, servants' wages, and incidental expenses, $7\frac{1}{2}$ per cent on £150				
		11	5	0
Reduction in tithes, $7\frac{1}{2}$ per cent on £200				
		15	0	0
		£216	5	0
Difference, equal to 2d. per acre additional rent				
		8	15	0
		£225	0	0"

Here, then, we have the doctrine developed under a new form. It is not that a reduction of $7\frac{1}{2}$ per cent on *labour* will compensate for a fall of 12s. the quarter on wheat, but that a reduction of $7\frac{1}{2}$ per cent on *all farming expenses and on some family expenses* will compensate for a decline of 20 per cent on wheat alone; the price of other descriptions of produce remaining unaltered. This state of things, however, cannot continue for any length of time. The fluctuations of seasons may cause a temporary disproportion in the relative prices of the different kinds of grain; but it is a truth generally admitted, and comprised in the farmer's pithy aphorism, "down corn down horn," that, on the average of years, the advance or depression in the value of one description of agricultural produce will be accompanied by a corresponding change in the price of the rest. The doctrine that a reduction of $7\frac{1}{2}$ per cent on the outgoings will compensate for a reduction of 20 per cent on the returns, and supersede the necessity for an abatement of rent, may be

very popular among landlords, but it is not surprising that the farmers dissent from it. They probably consider it to savour somewhat of the practice of milking the cow three times a-day, and underfeeding the horses—a muzzling of the ox that treadeth out the corn. On the subject of feeding horses it may be remarked, by the way, that without asserting steamed turnips and chopped straw to be the best food, there can be no doubt that great economy of fodder is effected by chopping all their hay, instead of giving it in the rack. It is equally certain that chopped gorse or furze is a valuable and economical food for horses. I have known an annual crop of it sold by auction, for this purpose, in one neighbourhood, during many successive years, at the rate of £20 an acre. That we have much to learn as to the best mode of feeding farm horses was proved by the discussion of this point in the Harleston Farmer's Club, when it appeared that a body of excellent managers, in one of the best cultivated counties in England, residing within a few miles of each other, and cultivating the same description of soil, with the same breed of cart horses, differed in their statements of the cost of maintaining them as much as 50 per cent, whether estimated by the head or by the acre!

It has frequently been urged that the Scotch system cannot be applicable to England, because so few Scotch farmers who have settled there have been successful.

"The low nominal rents," says Mr. Main,* "of many parts of England were seductive to many half-informed Scotch farmers, who too eagerly engaged English farms; but when called upon for their quotas of tithe, poor-rates, church and county rates, together with the higher prices of necessaries and of labour, they found themselves deceived; and when they thought of shielding themselves from the latter items of cost by the introduction of their own countrymen and customs, in this they were also defeated by the desertion of their men for better engagements in the neighbourhood, and fresh importations only served to linger out an attempt which was so different from the customs of the country where tried, and where it could not be pleasantly carried out. But still, Scotch farming and Scotch farmers are much respected; the first, for the economy with which it is conducted, and the second for their intelligence and steady character. But in countries which differ so much in manners and customs, and particularly in the modes of paying farm-servants, the one entirely in money, and the other partly in money, but chiefly in provisions, must make uniformity in the success of the masters, as well as the views, habits, and moral conduct of the labourers, impossible. It

* "On English Agriculture,"—*Quarterly Journal of Agriculture*, No. LIX.

often happens, from the improvident mismanagement of the English labourer, that towards the end of the week his cottage, if he has a family, contains none of the comforts of a home to him, no resources of either 'meal or malt' to lean upon, and only looking forward for Saturday night, to receive his ten or twelve shillings, which are mostly dissipated before he receives them. This improvidence has chiefly been brought about by the leniency of their old poor-laws; and though these laws are now more stringent, dependence on the overseer will never be obliterated until the present generation has passed away."

There is much truth in these remarks, as to the difficulties which Scotch agriculturists have to contend with in England, from the habits of the rural population, so different from those of the Scotch peasantry. But a principal cause of the failure of the Scotch farmers who settled in England has been one which would have equally overwhelmed them at home—namely the period at which they took the land. "I," said Mr. Andrew Howden, of Lawhead, in East Lothian, before the Committee, "am the only remaining farmer in the parish where I was brought up. Except myself there is not a farmer nor a farmer's son remaining in the parish—they were driven away by the money-rents that were exacted from them. They all conceived they were to have 80s. the quarter, and their calculations were made upon that. It soon appeared that they could not be realized—they were not converted, and ruin has been the consequence."

The people most likely to introduce a modification of the Scotch system into the South are Englishmen, practically conversant with agriculture, sufficiently divested of prejudice to adopt the most essential parts of the system, and possessed of sufficient tact and judgment to avoid doing unnecessary violence to the prejudices of their labourers and neighbours. It has been very properly suggested—I forget by whom—that landlords who wish to introduce improvements upon their estates would do better by persuading some of their principal tenants to send their sons for a year or two to the North, to study the Scotch system, than by bringing Scotch bailiffs to England.

For two-horse ploughs we need not have recourse to Scotland. Long before they were introduced there, they had been established in Norfolk, Suffolk, Essex, and Yorkshire, having been originally derived, together with the turnip husbandry, from Flanders. But, of the cultivation of turnips in drills, Scotland is the type. There it was invented; and there it is carried to the greatest perfection. It is well known in the army that a tailor makes a better dragoon than a groom; and none are so unsuccessful in growing turnips on ridges, at wide intervals,

as those who have attained to eminence in their culture on the broadcast system.

With regard to the two-horse ploughs, without asserting that there is no land in England which cannot be worked with two horses, it may be safely said, that the existence of some such land—if such there be—can be no reason why three or four horses should be employed on the soils constituting the majority which can be worked with two. Go where you will, whether on clay, or loam, or sand, except in the counties above named, you find the English farmers contending that two-horse ploughs will not do *here*, or that they will not do on *our land*; or if they are forced to admit that their land might be worked with two horses, they take refuge in the necessity of having three or four in their wagons on the road, or of rearing young horses for sale, or they tell you that harrowing is much better performed with three than with two. By the way," says a correspondent of Mr. Gregg's, "I had a second letter from Mr. C., inquiring about ploughing with two horses, and saying that his people invariably *set their faces against it*. I wrote him that this *setting of faces was stiffer than his stiffest clay*."

The fact is, that the more horses we put to a plough in line, the less work they perform. It is only the one nearest to the implement that is in the line of draught; all the others are working at a disadvantage; and with the most skilful driver, it is rarely that more than two can be seen pulling at the same time. He who would plough his land with two horses, should first visit those counties in which the practice is general. Let him convince himself, by actual observation, that land such as his own may be so worked, and then—being satisfied as to the practicability of the system—let him lay his hand to the plough and not look back. Let him determine that his land *shall* be so ploughed, in spite of all the setting of faces against it, on the part of his own people and of his neighbours, who choose to persist in obsolete and extravagant customs. The bigotry of his neighbours will be the last to yield—*comperit invidiam supremamque domari*; that of his labourers will be more easily overcome, because it is a lock which may be opened with a silver key. A certain facetious member of parliament once said, that people would not do their duty unless they were well paid to do it; and with equal truth it may be asserted, that, if it be made their interest to lay aside their prejudices, they will lay them aside. If the keep of a horse and the pay of a driver be saved, the farmer can very well afford to give the ploughman who drives for himself half the wages of the ploughboy. Let this distinction be made between the two classes of ploughmen, and let the discarded ploughboys be employed in other

profitable work—such as pulling and alicing the turnips for the sheep, instead of letting them waste from a fifth to a third of them in the mire—and the *gee-ho* ploughs will soon become popular. I never saw a lad who had learned to hold one who did not look upon himself as a superior order of being to his three-horse brethren.

Let one steady man, of good character, and skilled in the management of the two-horse plough, be engaged to act as foreman of the ploughmen, and to instruct the rest, who are to be taken, if possible, from the parish in which the farm is situated. Wherever ploughing is to be performed—in that field let all the ploughs be concentrated. It should be the office of the foreman to lead the others, to wait at the headland for those that lag behind; and he should be responsible for the manner in which the work is performed. When the strength of the farm is thus brought to bear upon one point, it will be found that much more work is performed in a day, than the same number of teams would accomplish in two or more detachments.

Of the difficulties and annoyances attending the introduction of two-horse ploughs into a new district, I speak from experience. I know, too, that they may be overcome; and I offer these hints for overcoming them, in the hope that they will be acceptable at the present moment, when the public attention is awakened to the subject, and when judicious economy in the conduct of farming operations, becomes of so much importance. I am familiar, also, with all the objections urged against them; the most popular being the cruelty of superseding the poor ploughboys, and the danger that the race of ploughmen may become extinct—"for if they do not learn by walking beside the plough while they are young, how are they ever to know how to hold it when they grow up?" and again—"it is better to employ them so than to have them on the parish." Statesmen, who ought to be wiser than farmers, have recommended the employing of people in digging holes one day, and filling them up the next; and far better would it be so to employ them than to be at the expense of keeping a superfluous horse, in order to make work for a superfluous ploughboy.

Southern though I am, my prejudices run in favour of the Scotch system; because under that I commenced my farming career.

In my younger days, my father, who, in conjunction with other occupations, had been farming all his life upon a small scale, and without deviating from the practice of the neighbourhood in which he resided, took a farm of 300 acres, which he determined to plough with two horses; and the management of it, under him, devolved upon me. Knowing that it would be useless to bring "foreign" ploughs, that is,

ploughs from another county, without men accustomed to hold them, and capable of instructing "the natives" in the use of them, and his predilections from family connection being in favour of Suffolk, he had determined to engage ploughmen from that county; but, on purchasing for his sheep some drilled turnips off a Scotch farmer settled in the neighbourhood, he was so struck with the superiority of the crop over any that he had ever before seen, as to determine to adopt the drill culture of turnips, in conjunction with the two-horse ploughs, and to have recourse to Scotland for his ploughmen. At first they were all from the North; subsequently the majority consisted of young men, whom they had instructed, and who soon became expert; together with one Suffolk man, who had gained a settlement in the parish, having been brought by one of the oldest farmers in it from his native county, when making an attempt, which he had abandoned, to work his land with two horses. This unsuccessful attempt was held up as a warning to us, by those who predicted that, in less than three years we should be dragging the ploughs along the surface—"it wo'n't do on our land." During the 14 years that my father held the farm we were never without one Scotch ploughman, who acted as leader of the others, in the way I have described. When my father quitted the farm, the tenant who succeeded him, and who came from the sands of Surrey, which he had been accustomed to plough with three and four horses, was so pleased with the system that he adopted it, and has retained it to this day. When I asked him a few years afterwards, during the period of agricultural distress which produced the Parliamentary Enquiry of 1836, whether he still ploughed his land with two horses, his reply was—"If I did not, I am sure I could not plough it at all." Meanwhile the two-horse ploughs are creeping into use in the district, though but slowly. In our time there was one Scotchman settled about four miles from us, and another at the distance of about eight. These were the only farmers, except ourselves, who worked their land with two horses. They were both located on poor soils at very high rents. One gave up his farm, after having sunk a considerable capital on it; and removed into South Wales soon after I became acquainted with him. The other, who was the best farmer of the two, but had a hard struggle from his high rent and want of capital, I believe, saw his lease out. I lately witnessed, on the adjoining farm to ours, held by one of the largest and best of the old tenants of the district, several two-horse ploughs, intermixed with his three-horse teams; and I see by a report in the *New Farmer's Journal*, that at the late ploughing match of the Agricultural Association of that county—there was none in existence in our time—no less than

five premiums were awarded to ploughs drawn by two horses, the premiums being divided into the three following classes:—1, for champion ploughing; 2, for ploughs drawn by two horses without a driver; 3, for ploughs drawn by three horses with a driver. Here was a great revolution, but how slowly effected—for twenty-six years had elapsed since the first furrow was turned with two horses on my father's farm—and how imperfect in its effects, even yet. In less than that time, Small's improved Rotherham plough, introduced from Yorkshire, entirely superseded, through the whole of Scotland, the old clumsy implement—the counterpart of that which still lingers in Middlesex—drawn by three or four oxen or horses, not unfrequently two of each; and in less than half that time the culture of turnips in drills, with the dung immediately under them, spread over the whole of Scotland and the English border, from the farm of Mr. Dawson, on which it was first tried.

A distinguishing feature of Scotch agriculture is the rapidity with which improvements, wherever invented, are adopted, and the absence of prejudice against them, on the part, not only of the farmers, but of the peasantry. By some this is attributed to the superior education of the agricultural classes of the North; by others to inferiority of soil and climate, which necessitates exertion. It is probably due to a combination of the two causes.

Our ploughs were, in the first instance, the Scotch iron plough, of Small's pattern. These we subsequently exchanged for iron ploughs of a construction better adapted to our land—a stiff loam, free from stones—made somewhere in Gloucestershire, near Morton-in-the-Marsh. Great improvements in the plough have since taken place, and I have no doubt that some of those made in Suffolk and at Reading are superior to either. But these improved implements, wherever made, have formidable difficulties to encounter. Every district has its celebrated village plough-maker, who is resorted to by the farmers of many neighbouring parishes. He soars above the common principles of mechanics; he despises all mathematical calculations as to the proper curve for the mould-board, or even the more practical plan of casting it from the actual twist of the furrow-slice. His knowledge of the art and mystery of plough-making is derived from direct inspiration, communicated to some of his remote ancestors by the *unci puer monstrator aratri*. It has become hereditary in the family, and within a circle having a radius of nearly five miles, it is confidently believed that no one can make the wood-work of a plough suited to the soil and climate of that particular locality except a White, and that no one can make the share and the coulter except a Penfold. To the importance and the pecuniary interests of such august

personages the success of the new-fangled ploughs would be a heavy blow and a great discouragement. They are connected, probably by the ties of consanguinity—certainly those of good fellowship—with some of the small farmers and many of the labourers : among them all they are oracles. They form the centre round which nearly defeated prejudices find a rallying point. In the nightly lectures delivered by them on agricultural subjects at the Rose and Crown or the Harrow, where it can no longer be said that “ news much older than their ale goes round,” but where the rustic population imbibe with their beer, and inhale with their tobacco, the most recent political information, and the newest sedition—be it that of the Register or the Dispatch—there these sages enlarge on all the most popular objections to the dandy ploughs, and do not fail to impress on their admiring audience the folly—not to say wickedness—of attempting to plough land with two horses. “ No, no, it won’t do—you must have a good strong plough and plenty of strength to work land as it should be.” This strength of plough it is which necessitates the strength of team : but such sentiments are sure to find an echo in the breasts of those who have earned well-merited fame as skilful holders of these good old-fashioned implements.

Six pairs of horses, with one odd one, of clean-legged, quick-stepping breeds—one of our best was a cast mare from the Life Guards—performed the work of the 300 acres, which included the carting to London of the potatoes of 40 acres, and the wheat straw of nearly 100. We likewise drew to the homestall as many turnips as sufficed for the keep of at least 500 sheep, kept in yards from November to April. Except in breaking up ground during a long drought, we never ploughed less than an acre a-day for the first ploughing ; under more favourable circumstances an acre and a quarter was a common day’s work, and in stirring turnip fallows we frequently did an acre and a-half. The work was performed at two journeys, or as the Scotch call them, yokings, except during the very shortest days of winter. This part of the system is perhaps as unpopular with the Southern ploughmen as any, because they have less time at their disposal for the public-house.

At first our proceedings were severely criticised, with every disposition to pick holes in them ; and every crop that failed was ascribed to the little kicketting ploughs. After a time, some of the more candid of our neighbours owned that our work was as well performed as theirs, and that we did more in a day ; and I was often also asked how we managed to keep our horses in so much better condition than theirs. This they attributed to our going less to the London market, as we carried up neither green peas nor turnips, like most of them. In this

there was some truth ; for the night-work of Covent Garden causes great wear and tear of horse-flesh ; but the difference arose principally from our horses having all their hay cut into chaff. Some even went so far as to admit that, though the system did very well as far as the work upon the land was concerned, it was inconvenient for the road ; upon which, they contended, that three horses in a cart or a wagon, answer better, and that this cannot be made to accord well with ploughing the land with two horses. Were it not for this, and the difficulty they would have to encounter from their work-people by a change of system, they would, perhaps, they said, adopt it. But why should they give themselves trouble, and incur unpopularity, only to raise the value of the land to the landlords ; for, if it could be ploughed with two horses instead of three, these would ultimately gain the difference in the shape of increased rent ?

Our road-work was performed with two-horse carts, with copses and tail-ladders. The same carts served for harvesting from, and for drawing out dung to the distant fields. Near home we used one-horse carts, with frames for harvest work. We also used one-horse carts for distributing the manure over a field in which it had previously been deposited in compost heaps. If, however, wagons be considered indispensable, they are not inconsistent with the use of two-horse ploughs ; for they are employed conjointly in Norfolk. I have spoken of the horses being fed entirely with hay cut into chaff. Of this they were allowed as much as they would eat, and the weekly consumption of the thirteen horses never exceeded 18 trusses of hay, cut up with 6 trusses of wheat straw, besides the wheat chaff. Their usual allowance of oats was 2 bushels each per week. When the hay got dry, in the spring, we soaked the cut hay and straw in water for twelve hours, before it was given them. It was to the short time they required to fill themselves when thus fed, and the longer time they had for rest, to which their good condition was in a great measure owing. Against this mode of feeding horses, there will, in the first instance, be great setting of faces on the part of the men. It requires them to stay with their horses later of a night, in order to replenish the manger ; but when they find the cattle thrive under it, their prejudices in time subside. They will always, however, try to give them hay in the rack, in addition to the chaff ; which we found it impossible to prevent, by anything short of taking the racks down in the winter, and putting them up again in the summer, when they were wanted for green meat. The mangers require to be made deeper than usual by about three inches ; and bars must be placed across them, at the distance of two feet, to prevent the

horses routing the chaff out, when trying to pick out the corn. Instead of carrying hay with them into the field, or on the road, they will require more bags for the chaff.

Our potatoes and fallow turnips were all grown on the one-bout ridges, with the manure immediately under them, and at intervals of 27 inches. *Rape* and *late turnips* after tares were sown broad-cast. I should now drill these on the flat at 18 inches. For swedes and white turnips, intended to be consumed before Christmas, I decidedly prefer 27 inches between the drills. Such intervals are best suited to space occupied by the wheels of the dung-cart and feet of the horse. They admit of the most effectual cleaning and stirring of the soil, by means of the horse-hoe or the one-horse plough, followed by the drill harrow ; which stirring of the soil both practice and science concur in considering favourable to the growth of the plants. I believe, also, that the wide intervals produce the heaviest crop ; but, as very large turnips certainly do not stand a severe winter so well as those of a smaller size, I consider the narrow intervals better adapted to the late sowings ; and this, I believe, is now the practice of Scotland.

The objections against the growth of turnips on ridges, at wide intervals, are as familiar to me as those urged against the two-horse ploughs. Your neighbours are afraid you lose ground by it. Those labourers who have attained celebrity as hoers of broad-cast turnips, find all their skill superseded when applied to those that are drilled. They thus lose their vested interest in the turnip crop, and are, therefore, opponents of the drill system, until they have gone to school again, and learned the knack of setting them out in single plants at two strokes of the hoe, by alternately drawing it to, and pushing it from them across the drills. Those who will condescend to learn this system soon become expert at it, and find that at the same price per acre they can earn more money than in hoeing broad-cast turnips. As soon as this is the case, you hear no more from them about the loss you incur by drilling your turnips. The shepherd is not only inoculated with the prejudices of others, but exercises his ingenuity in discovering objections connected with his peculiar department. Every sheep that is cast is, according to him, cast owing to the hollows between the drills. Hollows, however, need not be ; for, if the horse-hoeing has been well performed, the ridges will have become nearly obliterated by the autumn ; and, upon dry soils, I am no advocate for earthing up the turnips at the commencement of the winter. He considers, likewise, that there is not so much "proof" in large as in small turnips ; and, in his double capacity of physician and coroner to every sheep that dies of scouring, giddiness, or any other

malady beyond the resources of his healing art, imputes it to the "*firmness*" of the crops, and to their being poisoned with dung. To crown the list of objections, the sportsmen complain that the birds do not lie so well in drilled as in broad-cast turnips.

With a dressing of 20 tons of farm-yard dung, we commonly produced 20 tons of swedes, and from 25 to 30 tons of the white globes to the acre; and this upon our stiff, as well as upon our lighter loam. The weight of single roots of the former I have frequently found 7 and 8 lbs; and of the latter 15 and 16 lbs. The first person I knew disposed to do justice to the superiority of our crops, was the shepherd of a neighbouring farmer; to whom we had sold a few acres of red tankards. He trumpeted not a little, through that and the neighbouring parishes, the greater quantity of feed in an acre of ours, compared with the best broad-cast crops—and very good they usually were—of his master; and I have been more than once jocosely accused of having bribed him to do it. This, however, so far from causing the adoption of the system by others, only induced greater activity and ingenuity in the search for objections and of reasons for not adopting it. Among these the most formidable were the unequal distribution of dung for the ensuing corn-crop; and the greater exposure to drought of the seed and of the infant plants, upon the ridges, during an unpropitious season. The first objection is easily obviated, when the state of the ground and the dryness of the weather permit a dragging to be given across the drills, in preparing it for corn, in order to spread the dung more evenly. Should long-continued drought set in immediately after sowing, the turnips may, perhaps, fare worse upon ridges than when sown broad-cast, or upon the flat; but in bad turnip seasons, when our neighbours sowed twice, and even thrice, before they obtained a plant, we rarely had to sow more than once; though in such seasons we did not raise so even or so heavy a crop, as when the weather was more propitious. Where the ridge system is adopted, it is very easy to fill up vacant spaces, by dibbling in cabbage plants, or sowing white turnips, or rape. In drilling on ridges, with the dung immediately under the seed, if the work be properly performed, so that the drill follows close upon the dung-cart, and the seed is deposited while the manure and the soil retain their moisture;—if it be placed deep, so as to be nearly in contact with the dung; and thick, so that the plants force one another rapidly into the rough leaf, it will seldom happen that a plant will not be obtained; even in seasons when the fly is most prevalent. When dry weather sets in later, after the first hoeing, when the plants have developed a considerable surface of leaf, and have struck their roots well into the dung, I always found that they

resisted the drought better than the broad-cast turnips. In mildewing seasons, ours mildewed as much as others, but not worse. We found it best to sow swedes not earlier than the last week in May; earlier sowings being apt to run up to stem. The soil should be well pulverized; and this may often be done more effectively by a spring dragging across the deep autumn furrow, than by a ploughing. I believe it to be very good practice to dung for swedes before the autumn ploughing—when the dung can be commanded at that season of the year—and to drill bone-dust, or some such manure, with the seed in the spring.

Among those who admit the superiority of the turnip crops in Scotland, there are some who attribute it exclusively to the moisture of the climate; which they consider more favourable to the ridge system than that of the South; and to early sowing, which may safely be practised there. There can be no doubt that these contribute to it; but, as far as my experience has gone, it has convinced me that, even in the drier climate of the South, heavier crops can certainly be raised on ridges, at intervals of 27 inches, than on the broad-cast plan, or by drilling on the flat at 18 inches.

The Scotch assert that farmers from Lincolnshire, where heavy crops of drilled turnips are grown, are astonished at the greater fattening qualities of the turnips of the North. There may be a cause for this in the soil. It will be seen, by reference to Daubeny's table of the constituents of crops, that turnips contain a considerable quantity of potass; and, though the analyses from which that table was constructed are, probably, not quite so accurate as could have been wished, they, at any rate, furnish a good approximation to the proportions of the different substances which enter into the composition of the farmer's crops. Now, a glance at the Geological Map of the British Isles, by Phillips, is sufficient to show that on the skirts of the Cheviots, and in the Lothians, the soil must contain much of the debris of the trap rocks, which are so abundant in those districts; and the trap rocks contain a large proportion of potass. If this view be correct, instead of despairing of rivalling the Scotch crops, because of the peculiarity of the soil on which they are grown, we may learn from it how to improve the quality of the crops of the South, by adding to our turnip composts the potass in which our soils are deficient. This we may do, by means of pearl-ash or wood ashes.

Having commented rather freely on the prejudices of others, it is but fair, that, in conclusion, I should acknowledge some of my own, which time and experience have since removed. Having taken a large extent

of land in an impoverished condition, the mode in which my father brought it into heart was by means of turnips consumed on the ground by sheep. In order to raise the turnips, in the first instance, he proposed, instead of purchasing stable dung, which our situation enabled us to do, to employ, as a cheaper dressing, bones or rape-cake drilled in with the seed, according to the practice of Holkham, which was then beginning to attract attention. I, however, who considered that I had quite enough of innovations to defend against the banter of the neighbouring farmers, with whom I mixed at fairs and markets more than he did, and had heard them ridicule the use of bones as manure, preferred adhering to the muck-cart, and I had sufficient influence to prevent the adoption of a practice, which, I have now no doubt, would have been beneficial.

I was equally successful in resisting a proposal of his to sow a few acres of the worst of our heath-land with gorse, as a winter food for the horses. I had never then seen it used for that purpose; but I am now fully convinced, by observation and experience, of its value; and, on any land which I may hereafter cultivate, will not be without a sufficient extent of that plant to keep the horses from October to the end of April.

THE ANTI-CORN-LAW LEAGUE.

[From "Bell's Weekly Messenger."]

SIR,

Having been honoured by the notice of the grand muster of the Anti-Corn-Law League, which took place at Manchester last week, in having a Manchester paper sent to me, giving a full account of the meeting, and doubtless an authorized version of the speeches there delivered, I feel that silence on my part might be construed into conviction of an acknowledgment of the soundness of the arguments they contained.

I have read the different speeches attentively, and, without hesitation, assert that a more self-sufficient, now cajoling, now bullying, set of speechifiers, it has never been my fate to encounter.

As the statements of the different speakers, with regard to the state of the manufacturers, come from persons on the spot, and intimately connected with this part of the subject, I leave them to be discussed elsewhere by those much more conversant than myself on this head; but as the league has thought proper to appoint a "Committee to con-

sider the effect of the corn-laws upon agriculture," I may be allowed to make some remarks on the speeches made in that committee, even at the risk of calling in question the high authority of the chairman, Mr. Greg, who has not only published a book on the subject, but enforces at great length the doctrine there laid down.

Time and space will not permit me to remark on the whole of the chairman's opening address, and I shall, therefore, for the edification of my brother farmers, content myself with a few extracts, which will show the nature of the whole.

Before doing this, I must remind the landlords of this kingdom, that, last year, they were denounced as monsters of rapacity, who, by their high rents, swallowed up all the profits of farming, and reduced to abject poverty the agricultural labourers. Nay, it was asserted in the tracts, published by the league and disseminated over the whole kingdom, that *high rents*, and *high rents only*, were the sole cause of the distress of the manufacturers, and it was only for landlords to lower their rents and all would go on well, if followed by a repeal of the corn-laws.

The motive of this was evident. It was hoped to make a schism between landlords and tenants, and by thus following the tactics of the arch-fiend of old, to secure an easy victory over both. Fortunately, the occupiers of land saw that their property must be first sacrificed, and were not cajoled by the alluring bait. Having failed in this, a totally different system of tactics is now adopted, which, we doubt not, will fail in its object as signally. In proof that my statement is correct, I now make extracts from the speech of Mr. Greg. He says:—

"In fact, there appears no reason to dispute the opinion that the agriculture of ENGLAND is behind that of every other country in the world, where civilization has produced its harmonizing influence."

Does Mr. Greg use the beautiful words "harmonizing influence" from recollection of what took place at and near Manchester a few months since, when lawless mobs were suffered in open day to pillage and set on fire the houses of clergymen and others, who would not join the League?

Mr. Greg then adduces the evidence of Mr. Oliphant, as he says, one of the first authorities of Scotland, "that he knows of no land in England, in which he is not satisfied he could obtain a return of five per cent on all the capital and labour expended on it;" to which he, Mr. Greg, adds, "I have no hesitation in saying, from my own knowledge, that the produce of the land in many parts of England might be fairly doubled, and in many parts quadrupled."

This doctrine is totally different from that propounded by Mr. Hume and other advocates of abolition of corn-laws in parliament. They have always said, "too much capital has been already laid out in improving poor lands;" that such soils should be suffered to go out of cultivation. Indeed, the hon. member is reported to have said, that "if England did not grow a bushel of wheat, it would be all the better." I leave these gentlemen to settle this question between them. No two doctrines can be more opposed to each other.

Mr. Greg then relates an anecdote of a farm having been let at £600 a year, and the tenant applied for a reduction, and *actually gave notice to quit*; but that, instead of reducing the rent, the landlord immediately raised it to £1500 a year, and that the same tenant took it at the rent, raised *only* £900, that is, from £600 to £1500, was perfectly satisfied, and has saved money ever since. The story is so probable, there can be no doubt of its truth; but for the benefit of farmers, I should much like to know the names of the parties, because it is very wrong to hide the candle under the bushel, and we might learn much from such a miraculous circumstance.

Mr. Greg here again cannot suffer this to pass without comment, and adds: "*Now I have no hesitation in saying that this single anecdote is an illustration of three-fourths of the farmers of England; and if a stimulus was applied—I do not mean the stimulus of a high rent, although I do believe it would benefit in some instances the farmers—but still I am convinced, if the landowners would set about studying their real interests, and the interests of those who are in some degree committed to their care and keeping, and whose interests are in some degree identical with their own, I am convinced the rents might be DOUBLED; and that, instead of the farmers being what they are, A POOR, IGNORANT, POVERTY-STRICKEN set of men, they might be an educated, prosperous set of rich men, as we see existing in the tenants of the Lothians, for instance.*"

The honourable gentleman must have taken no little pains to make this long sentence palatable to both landlords and tenants. Thinking that he had attributed too much to the rise in rent, he stops short and qualifies the expression, but soon reverts to the great advantage of DOUBLING rents; not, I beg my brother farmers to think, to the landlords, but to the tenants, for they have only to pay rents twice as high as at present, and then, instead of being "*a poor, ignorant, poverty-stricken set of men, they are at once to become prosperous and rich.*"

Is it credible that any one would have uttered such insufferable trash, and that within a short distance of Liverpool, where the meeting of the Royal English Agricultural Society was held in 1841? Did Mr.

Greg honour that meeting with his presence? Were the farmers then assembled from all parts of England *a poor ignorant set of men?* *As to their being poverty-stricken*, I think it would have shown better taste not to urge their poverty as a reproach: at any rate it does this good—it shows the farmers of England what they have to expect at the hands of the great manufacturers, if they tamely submit to have their property taken from them by these millionaires.

In another place Mr. Greg says: “Now, gentlemen, it is evident that the protection held out to English agriculture is the real cause of its backward state, and the obvious remedy is to repeal those laws.”

I believe Mr. Greg will find some difficulty in making the agriculturists believe this. May I ask what has made our manufactures for so many years superior to all the rest of the world, but the fostering care and encouragement they received at the hands of the state, which ensured, at any rate in the home market, a sale for them without the danger of foreign competition? Again, Mr. Greg says—“The land, under the operation of corn-laws, produces less by one-half than it would do were all protection to be done away.”

Again, I ask, is it possible any person can have uttered such absurdities?

The hon. gentleman, after making other allusions to the ignorance and idleness of the English farmers, adds—“There will be no cessation from agitation till the question is settled. *There can be no settlement but on the basis of TOTAL REPEAL.* (Loud cheers.)” Does not this show the folly of expecting to put down agitation, as Lord John Russell advises, by changing the graduated scale for a fixed duty?

My father and myself have received many acts of kindness from the house of Russell for a great number of years; but I should be ashamed of myself were I not to avow my honest conviction of the truth of Sir Robert Peel’s words, when he says, that there would be just as much agitation against a fixed duty as against the present laws, and, therefore, if agitation is to have what it wants, only a total repeal at once would satisfy that.

I am perfectly astonished that any man of Lord John Russell’s intellect can think otherwise. After the late meeting of the League, and the sentiments then broached, it is idle to expect that anything less than a total repeal would satisfy the agitators.

Reverting to the meeting at Manchester, where Mr. Greg and others were so kind as to take myself and other brother farmers under their special protection, I come to Mr. *Alderman* Walker, who moved the following resolution:—

"That the notoriously backward state of English agriculture may be traced principally to the protection professed to be held out by the corn-laws, and which have encouraged the landowners and farmers to fancy that monopoly is necessary to secure those profits which, in truth, can only be permanently maintained by a judicious and liberal and skilful management of land." The worthy alderman also added, that "*in every county in England, bad farming was the rule, and good farming the exception.*"

Many thanks, most sapient alderman, for the compliment to English farmers; an opinion pronounced *seriatim* by such a judge, must carry conviction. But, joking apart, what would be thought of a meeting of farmers taking upon themselves to discuss a question of manufactures—as to the best mode of manufacturing this or that article? Would they not be the laughing-stock of the country for their ignorant presumption? But I forget. They are already, in the language of the chairman, "*a poor, ignorant, poverty-stricken set of men.*" The resolution was carried unanimously.

Next comes a Mr. Chadwick, to propose the second resolution. It does not appear whether Mr. Chadwick is a manufacturer, but I conclude he is. The resolution is this:—"That a total repeal of the corn-laws, by withdrawing every appearance of, and confidence in, protection, and by giving the agricultural interests clearly to understand that they, *like other* interests, have nothing to depend upon but their own exertions, would not only be an act of imperative justice to the country at large, but would tend to promote the best interests of agriculture." This also was carried unanimously.

Next comes Mr. Sheriff, bred a farmer in Scotland, who states that "his brother, a farmer in Scotland, says, that, with the same rent, and without trenching upon the present wages of the labourer, he will undertake to sell *wheat* as cheap as his grandfather did, TWENTY-SIX SHILLINGS A QUARTER."

I should feel deeply indebted to Mr. Sheriff if he would let us Southrons into this Scotch secret. I would also ask Mr. Chadwick if *all other interests*, except agriculture, have *no protection*, as stated in this resolution.

But your readers must be tired of such nonsense. As the League, with their £50,000, are disseminating their tracts to the amount, as they state, of three tons and a half weekly, I thought it right the farmers of England should have some information as to wisdom of the heads of the League.

These tracts are, some of them, very ably written, and are, there-

fore, the more to be guarded against. The chief aim is to sow divisions between the owners and occupiers of land, and to set the agricultural labourers against both.

May God grant that their mischievous schemes may not succeed. May the same loyalty which has always been ready to support the throne and constitution in time of need, continue to animate the feelings of the agricultural classes, and Old England may yet, for years, remain the envy of the world.—Your obedient servant,

JOHN ELLMAN.

GLYNDE, near Lewes,
Feb. 8, 1843.

PAYMENT OF AGRICULTURAL LABOURERS.

SIR,

Among the various topics which have lately agitated the public mind, that relative to the wages of labour has been discussed; and a question has been put, whether or not the price of provisions affects the rates of labour? Much has been said on both sides of the question; some affirming that high-priced provisions must necessarily advance the labourer's wages, and others as positively denying that high prices have any such effect. The opponents appeal to times and circumstances which have long passed away; each choosing such circumstances which only appear to support his own side of the question. However such matters may have taken place among the manufacturing community I cannot pretend to say; but, between farmers and their labourers, certain rules from the earliest times have been mutually agreed upon for regulating wages, whether by the year or by the day.

It is to be considered that before money was the circulating medium in these kingdoms, the landlord, the vassals, and lowest rank of labourers were joint sharers in the produce of the cultivated land. Rents, tithes, and wages were only paid in kind; and this custom continued till money became more plentiful, when the corn shares were commuted into money payments. Now, as the original remunerations were in *quantities* irrespective altogether of money value, so the value of the quantities always remained as the basis on which the money wages was computed and paid. This state of things continued from a far distant period up to about the beginning of the present century, when the affairs of farmers and the condition of the labouring class were so materially deranged. The price of corn advanced higher and higher, and the wages of labour kept pace therewith, and which had the effect of en-

abling the labourer to regale himself with larger quantities of excisable articles than he had hitherto been accustomed to. He also became liable to pay indirect taxes to a considerable amount, say from £3 to £4 per annum, which new burthen induced his employers to allow him a higher rate of wages than he was bound to allow according to the old standard.

The old standard was regulated by the price of wheat at the nearest market, in this way—whatever was the price of a bushel of wheat in shillings, twice that sum in pence was the day's wages of a labourer. For example, if a bushel of wheat cost 10s., then the labourer's wages were 20d. per day. But after the labourer became subject to pay so much indirect taxation on his shoes, soap, candles, &c., it was deemed nothing but even-handed justice to pay him 2d. per day additional, so that when wheat was 10s. per bushel his wages would be 2s. 2d. per day, or 13s. per week.

I am uncertain whether this was a general usage over the whole kingdom, but if there was any difference in the amount in the northern parts, the principle of varying wages according to the value of wheat was universal.

It would have been a lucky circumstance for the English agricultural labourer, if the custom of paying him wholly or partly in kind had never been abandoned. In Scotland it is still continued with the very best results to both master and servant. To have always something, however homely, in the cupboard for a labourer to lean upon, is an attraction of far greater value than a few odd shillings in his pocket, which are so fugitive; and with a thrifty wife, a flour-tub filled every week or fortnight, a store of potatoes or a small garden, with a flitch of bacon, cut from one of his master's fattened hogs upon the rack, what more need an industrious man desire. Such a situation is even an enviable one, especially when free from all those fears and cares incident to the man who has no such home, or who is engaged in the struggles and business of life.

Although we have but few examples of this tie between masters and men, or of labourers so happily placed; and though there is much to be done to new-mould the agricultural community into a better order than at present exists, still, there is no knowing, from the present aspect of affairs, how soon the British farmer may be compelled to pay his men in kind instead of in money; or how soon he may be obligated to unite the businesses of both butcher and baker to that of farmer, for his own immediate profit and the convenience of his own establishment. I know not whether the law allows the farmer to be also a common brewer, but this is a privilege which should be allowed him for the supply and comfort of his own dependents.

I am here projecting great changes ; but it is not an utopian dream ! it has been heretofore, and is now in actual and successful operation ; and the fact is, something must be done : the labourers must be cared for ; they must be well fed, and lodged, and clothed, not out of charity, but out of their own earnings, if they can be but persuaded to be friends to themselves. I am only contemplating the regular hands attached to every respectable farm, and have no doubt but that, in numerous instances, it would be gladly accepted. I know well the objections that would be made to such a system—"We have earned our money, and why should we not have it to do as we please with it." This observation I have often heard from the flippant tongue of a ragged gipsy, who could not have credit for a twopenny loaf ! Such a feeling is a modern infatuation, and which the firmness of the masters and the best friends of the labourers must endeavour to counteract. Clear and well-defined conditions should be proposed by the masters, and voluntarily accepted by the servants ; so that there should be no cause of ulterior misunderstanding. I do not mean that farmers should keep a chandler's shop, as some of the master manufacturers do or did, and by which they realized an intermediate profit on the goods, not quite honourable to the employer of the poor and often improvident operatives. No ; I only advise that the produce of the farm, in the shape of flour, bacon, butter, butchered meat, and if possible, bread, potatoes, and beer, should be regularly served out instead of money.

The advantage and comfort of such an arrangement to the agricultural labourer, especially if he has a wife and family, are incalculable. He has a personal interest in the well-being of his master, and in all the business of the farm, to which he becomes honestly attached, because it affords him a comfortable home.

The same circumstances which render the change above alluded to necessary for the married servants on a farm, will, no doubt, operate upon the minds of the masters who have been in the habit of paying the unmarried men and boys board wages, to alter this system also. This separation of the farmer's family was conceded at the special instance of the young men themselves ; and as a cure for their discontent at being obliged to eat that food which was not chosen by themselves. It was, however, an unfortunate change, and especially for the young men ; who were, in consequence, obliged to repair to the nearest villages for their common necessities ; and where they often met with company that did them no good ; and where hundreds of them were ruined as useful labourers. The impending pressure upon the farmers may, I say, bring about again those more economical methods of paying servants, and in making the most of the produce of the land.

Among other things, breeding and fattening live stock of all kinds will become a leading part of the business of farming; and more now, perhaps, than ever. For, according to present appearances, all our inferior kinds of corn will be low priced; and, therefore, better consumed at home, than given away at market. New kinds of crops will also be tried—all forage plants where they have not been tried before; and, where the soil is suitable, the hop, flax, hemp, medical poppy, and teasels for the clothier, may be introduced. And, were the growth of tobacco allowed, there is no doubt but an inferior quality of this luxury might turn out a remunerating crop; but by no means should it be admitted as a substitute for corn. Several sorts of culinary vegetables may be cultivated for feeding live stock with the very best effect. Cabbage, carrots, and especially parsnips, would be found valuable accessories in the mangers and troughs of the stables and feeding-houses. A large copper, a slicing machine, and a firm resolution, are only wanted to begin.

Now, these remarks are not new; they have been presented to the notice of farmers in many books, in lectures, and speeches, for scores of years past; but never before, perhaps, have they been so interesting as at this time, when the old routine of farming will probably be seriously disturbed by foreign rivalry.

Necessity, it is said, is the mother of invention, and, if the British farmer be destined to suffer from any unusual pressure on his means or measures, he will naturally have recourse to whatever rational scheme, or schemes, which occurs to him, either for the purpose of saving expense or increasing his income.

J. M.

Jan. 27, 1843.

CATECHISM OF AGRICULTURAL CHEMISTRY.—III.

[Concluded.]

To resume our subject at the point where we left it, at p. 511 of the last volume (No 24), on the *muriates*, and commence with—

XXVII. The *nitrates*. The enquiry concerning them is very interesting.

1. *Nitrate of lime*? This combination of one equivalent each of lime and nitric acid, is not, in any way with which we are acquainted, of utility to the farm: nor would it have been noticed here, but for the purpose of correcting a very common mistake. We observe, occasionally a beautiful effervescence upon old plastered walls, which most

persons believe to be saltpetre; hence the term “saltpetre walls.” To satisfy oneself of the fact—if a small quantity of the salt, taken so lightly from a wall as to avoid bringing off any of the plaster, be first melted at a gentle heat in an iron spoon, and then brought to a red heat, it will be decomposed, the acid driven off, leaving the pure lime. Saltpetre, on the contrary, would melt, and finally leave a solid mass—having parted with the water that is loosely, but not chemically attached to it.

2. *Nitrate of potash.*—Saltpetre or nitre. A combination of potassa and nitric acid: one equivalent of each. It appears to be chemically free from water, as a necessary constituent, but its crystals contain water in their interstices; hence they lose weight by melting in an iron ladle. After fusion, nitre solidifies; and thus, by refining upon the process, chemists have prepared the balls and cakes called *sal prunella*. Exposed to a strong red heat, in an earthen retort, nitre is decomposed, and yields a volume of oxygen gas, combined with nitrogen.

When projected upon red-hot charcoal, or other fuel, nitre is rapidly decomposed; its oxygen unites with the carbon of the combustible, and forms carbonic acid gas; and a white salt remains, which is little else than carbonate of potassa, or common pearl-ash. Under different circumstances the results of the decomposition of saltpetre, by combustion, are exceedingly multifarious.

Rough saltpetre is a production of nature. It forms an article of commerce with the East Indies; and its purification is carried on to a very great extent in the chemical laboratories of Britain, and by the manufacturers of gunpowder.

As a *manure*, it was employed at a very remote period.

3. *Nitrate of soda?* Cubic nitre of old chemists. It consists of soda and nitric acid—one equivalent of each; but though a somewhat moist and deliquescent neutral salt, it does not seem to contain any water in a state of chemical union. It weakly defragnates with *ignited* combustibles, but with none of that energy which characterizes the action of saltpetre. Large quantities have been recently imported for the purposes of agriculture; but its absolute utility, as a certain fertilizer, remains problematical, and dependent upon isolated facts. It is subject to adulteration, and, like rough petre, contains varying portions of common salt: hence the question of its solubility in water is subject to difficulty. One chemist gives it thus:—

100 parts of water at.....	32° (the frosty point)	dissolve	80·0
Ditto ditto.....	50°	ditto ..	22·7
Ditto ditto.....	60°	ditto .	55·0
Ditto ditto.....	246°	ditto ..	218·5

A remarkable irregularity, if correct, and for which it is not easy to trace a cause.

When used on grass lands there can be little doubt that it renders the verdure much more intense. 112 lbs. per acre, mixed with fine ashes, or light loam and manure, are sufficient. In these cases it is used as a top-dressing; scattered evenly as possible over the surface about the beginning of March.

Of the *rationale*, we know little, either as respects nitre or nitrate of soda. If the salts be decomposed by the soil, under the agency of the vital principle of vegetation, the bases, potassa and soda, will be appropriate, according to the assimilating power of each individual crop; and if the decomposition extend to the acid, and separate its elements (azote and oxygen), these gases perform their definite offices. But the enquiry is involved and perplexing. Its attendant difficulties may, perhaps, ultimately be solved by analytic chemistry, and a further light in vegetable physiology: in the meantime, as the salt is cheap, and of easy application, experiments can be safely made in field and garden. We have used it with every kind of garden crop without injury, and have, consequently, raised finer spinach than we ever before produced. 14 lbs. seem ample for spring dressing of a quarter acre of garden; and as top-dress it assuredly is inimical to slugs.

XXVIII. *Nitric acid?* Five equivalent proportionals of oxygen gas, and one of nitrogen gas, constitute *nitric acid*.

We are indebted to Mr. Cavendish for the demonstration of the general theory; because, by "a succession of electric sparks through a mixture of seven volumes of oxygen and three of nitrogen, he reproduced the acid." Referring to a later experiment, by Mr. Faraday, of the Royal Institution, we obtain a glimpse of the paramount and all-pervading influence of electricity:—"By moistening a very small strip of litmus paper with a solution of caustic potassa, and then passing a succession of electric sparks over its length in the air, Mr. Faraday gradually neutralized the alkali, and ultimately rendered the paper red; and on drying it he found that *nitrate of potassa* had resulted from the operation; and that the paper had become touch-paper."

This beautiful confirmation of Mr. Cavendish's experiment proved two important chemical facts: first, that electricity produced nitric acid, by effecting the combination of the elements of the atmosphere (nitrogen and oxygen); second, that the acid so formed, combined with the base *potassa*, and produced *nitrate of potash*; i.e., salt-petre.

Pure nitric acid is seldom met with in the shops. The orange fuming

liquid sold is the *nitrous acid*; that is, nitric acid combined with a portion of nitrous gas, which latter escapes in the form of red fumes. Chemists estimate the elements of this acid at 4 proportionals of oxygen, and 1 of nitrogen.

Nitrous and nitric acids are essential to the laboratory. They rank among the most energetic of re-agents; but are not of great utility in the chemical researches of agriculture.

XXIX. *Nitrogen*?—the modern designation of the gas which has already been alluded to as *azote*. Great importance has of late been attached by agricultural writers to it; especially since the appearance of Liebig's Organic Chemistry. It appears to be a necessary constituent of animal structure; and vegetable analyses reveal it very frequently. Of its electric relations chemists profess to be entirely ignorant; but they must be very important, since nearly all the powerfully detonating compounds contain it. On this, Brande observes, when writing upon the combination of nitrogen and chlorine called *chloride of nitrogen*, that a small globule of it, about the size of a mustard seed, placed in a china basin half filled with water, explodes, with a flash of light; dispersing the water, and breaking the basin to atoms. He says further—the appearance of flame or fire is here not the result of condensation and union, but is accompanied by expansion and decomposition; by the separation of the two bodies previously combined.

Nitrogen is one of the elements of ammonia; and thus we obtain, in a degree, the solution of the difficult problem of the formation of ammoniacal gas; for as it is copiously revealed in the processes of animal decomposition, in stables and fermenting masses of manure, it is quite evident that nature effects that union of the one volume of nitrogen with the three volumes of hydrogen, which art has in vain attempted to accomplish. As, however, the electric spark does decompose ammoniacal gas, by the separation of the elements, which then occupy twice its space, there is evidence furnished that the union of those two elements was a process of electric attraction.

Nitrogen forms explosive compounds with chlorine, iodine, and some metallic bodies. With hydrogen it produces, as we have seen, ammonia; but of all its combinations, those with oxygen are the most important.—See *Atmospheric Air*, in Part I.

We are but too apt to overlook the grandest and most exalted phenomena, because we are ever familiar with them, while we are struck with awe at a circumstance of the passing moment, which may never recur again, merely because it appears to involve some mystery.

When, however, we reflect, that solely by an alteration of their rela-

tive proportions, the two gases, nitrogen and oxygen, can combine to form the air which sustains respiration, and is the supporter of every vital function—and then nitrous oxide, nitrous gas, nitrous and nitric acids, all dangerous to life, the two last violently corrosive—and that every flash of lightning converts a definite volume of the atmospheric gases into these acids—we shall have abundant cause for more than admiration. It may not be superfluous or incorrect to suggest, that, as every putrefying substance exhales a portion of ammoniacal alkaline gas, which passes into the atmospheric volume, a chemical union of the two gases will check the accumulation of either, by producing a saline compound (*nitrate of ammonia*), perfectly soluble in water, and which thus will be conveyed to the earth, and become, in all probability, an agent of fertility. The grand fact, that not one particle of nature's products can ever be lost, justifies the conjecture, and others of a similar description, which, to unreflecting minds, appear wild and visionary.

XXX. *Oils* are peculiar products of organic action, animal and vegetable: they are classed under two distinct heads.

1. *Fixed or fat oils*. These are obtained either from animal fat or by pressure from the seeds of vegetables. They contain two or three substances which possess distinct and remarkable properties. Take, for example, common tallow, obtained from the fat of oxen and sheep; it is solid at the ordinary temperatures of our climate, but becomes fluid and acquires the consistence of oil at about 100° or 102° of Fahrenheit's thermometer. Subjected to pressure, a fluid separates, to which the names of *elain* and *olein* (from the Greek noun *ελαιον*—oil) have recently been applied. The solid part which remains is termed *stearine*—now used in the preparation of composition candles; it bears a close resemblance to spermaceti (*cerin*), which represents the stearine of whale oil.

Olive or sweet oil, when exposed to low temperature, congeals, and exhibits a concrete principle called, by some, *margarine*. All fat oils contain a very great proportion of carbon; that is to say, by chemical analysis they are reduced to the elements carbon, hydrogen, and oxygen, in varying quantities. Thus olive oil, according to Gay Lussac, gives the following results:—

Carbon	77.213 per cent.
Hydrogen	13.360 "
Oxygen	9.427 "
100°	

These oily substances are excellent manures; and when, as Davy observed, they are mixed with sand or any common soil, and made into a heap, they form a durable manure, in consequence of the gradual de-

composition they undergo. "The carbon and hydrogen abounding in oily substances, fully account for their effects."

2. *Volatile or essential oils* are generally obtained by distillation from vegetables, their leaves, bark, flowers, or seeds. Among those most commonly met with are the oils of turpentine, peppermint, lavender, and lemons. They differ from the fat oils essentially, in being volatile and capable of distillation with water; at the boiling point of which, they rise in the state of vapour. The *fixed oils* cannot be distilled, or volatilized by heat, without suffering decomposition. The chemical analysis of essential oils produces most interesting results, but of no importance to the purposes of agriculture.

XXXI. *Organic products?* Terms now of common occurrence. They imply, in their broad acceptation, the results of vital action produced in bodies organized and endowed, to a greater or less extent, with the principle of life. They are resolved, almost without exception, into the elements of the air and of water: namely, oxygen, carbon, hydrogen, and nitrogen; the last is not always traceable in the products of vegetable organization. Carbon, though not perhaps a necessary element of atmospheric air, is proved to exist therein as *carbonic acid*. It is, therefore, an indispensable *condition* of that air.

Inorganic substances are earths and saline matters, not referrible, so far as our knowledge extends, to vitalized organization.

Allusions are here made to these products, in order to introduce an admission on the part of some chemists, which ought to rescue their *pure science* from that attempt to prove *too much*, which has, with some reason, subjected learned writers to rather acrimonious criticism.

"There is a leading distinction between *organic* and *inorganic* compounds, which is this—that, in the *latter* the elements are generally united in *binary* arrangements,"—or, in more simple language, the elements are united in pairs: as, for instance, "crystallized nitre or saltpetre is composed of a *base*, potassa, which comprises two elements (the metal potassium and oxygen) and a neutralizing acid, the *nitric*, which, as we have seen, is constituted of nitrogen and oxygen. "But the *organic* products are *ternary* or *quaternary* combinations, which we can *scarcely ever imitate* by artificial processes, and in the formation of which a greater number of simple atoms are usually concerned: sulphuric acid, for instance, is a compound of one atom of sulphur and three atoms of oxygen; but tartaric acid consists of four atoms of carbon, two of hydrogen, and five of oxygen.

"Oxalic acid presents a striking peculiarity; it is composed of car-

bon and oxygen only, and contains less oxygen than carbonic acid, and yet is one of the most powerful of the acids; it is either a direct product of organization, or obtained indirectly from other organized compounds.

"If we endeavour to combine the elements of organic bodies by *artificial* operations, they show a tendency to pass into binary, and into ternary or quaternary compounds; and even in the living body, products that have already been organized appear essential to the formation of new ones. Thus vegetable life is in great measure supported by the decay of former vegetables; and graminivorous and carnivorous animals require vegetable and animal substances for their sustenance; for, although it is true that carbon, hydrogen, oxygen, and nitrogen, are the ultimate elements of our food, we should soon starve upon charcoal, and water, and nitrogen, or upon any of their compounds *which had not already undergone the process of organisation*.

"As, therefore, we cannot so combine the insulated elements as to imitate the products of organization, we are deprived, in our researches upon these forms of matter, of the aid of *synthetic* [recombining] proof; and in determining the nature and the relative proportions of the elements of organic compounds, we are limited to *analytic* operations; and even in them numerous difficulties occur, especially affecting the determination of the integral atomic weights of the compounds, and the theory of their elementary arrangements."

Thus wrote Brande, when introducing his notice of the analysis of vegetable products. The avowal is candid and just. The utter inability of man to detect, or reveal to his fellows, the mysterious processes of vitality, have been pointed out wherever occasion presented itself; and we again urge the fact, that, where vital action ceases, the researches of the chemist begin. Every vegetable body is organized: it comprises a series of tissue, vascular and cellular; in the cells are deposited fluids more or less elaborated by vital energy, susceptible of changes and modifications. We may obtain a glimpse of the vivifying agent, but we *know* it not. Every modern discovery points to electricity; because experience instructs that vegetable points rank among the most influential of electric conductors, and we possess proof demonstrative that the atmosphere and earth are replete with the undeveloped ethereal fluid. But here, at a point which is consistent with the modesty of ignorance, we stop, being content to offer an hypothesis that may induce research, while we disclaim, in toto, the slightest approach to dogmatic assertion.

We honour and revere pure chemistry; but, for its own sake, deprecate the application of its principles to interpret the phenomena of life.

Men of science, and of deep philosophical research into the elements and affinities of all matter which is justly subject to the laws of chemistry, ought not to subject themselves to the shafts of severe reproof, by assuming a false and untenable position.

XXXII. *Oxides?* A word substituted for the old term calx. The earlier chemists, prior to the reform effected by the new nomenclature of the school of Lavoisier, miscalled almost everything; thus, a metal rusted, or corroded by air, moisture, or chemical action, was said to be calcined—converted to a sort of lime (calx).

The *oxide of a metal*, and to this we restrict our remarks, is the product of a process by which any metal is made to attract and combine with a certain definite quantity of oxygen—by which it acquires an addition of weight precisely corresponding to the oxygen absorbed. As a familiar example of oxidation, the rusting of iron may be cited; but one which admits of closer inspection, and more beautiful in its immediate results, is that of lead, oxidised to the third degree (there are four), when it is called red lead. This is a sesqui oxide; that is, one in which a proportional and a *half* of oxygen combine with one proportional of the metal; or, 90 parts of lead combine, according to Berzelius, with 10 parts of oxygen, to form 100 parts of red lead. If 100 grains of red lead be thoroughly triturated with several times its weight of powdered charcoal, and then exposed to a red heat in a crucible, the oxygen will be attracted by the charcoal, and convert a portion of it into carbonic acid gas, leaving the lead *reduced* to its metallic form in the crucible. According to the accuracy of the experiment, so will be the approximation to the chemical estimate above given. At all events the lead will weigh considerably less than the red lead employed.

Lime, magnesia, alumina, manganese, and other earths, are bona fide oxides of metals; which, however, attract oxygen so powerfully as never to be found in their metallic condition. Metals are combustible; oxides of metals are not so: hence we infer that oxidation, however produced, is equivalent to a process of combustion, varying in its degree and intensity.

XXXIII. *Oxygen?* What is it? what its nature, and whence derived? Dr. Priestley first *clearly* discovered it on the 1st of August, 1774, by a process not dissimilar to that with red lead, mentioned above. He heated a quantity of the red oxide of mercury in a glass air-vessel, over mercury, by means of a burning glass. The mercury, under these circumstances, liberated a volume of an aerial fluid, to which the philosopher Priestley gave the title of "*dephlogisticated air*."

Lavoisier called this air *oxygen*, or the generator of acidity; because he conceived it to be the sole acidifier. The theory was partially incorrect, but the name is retained.

Oxygen is most familiarly known as an air or gas; but this is not its primitive condition. It exists everywhere, and, so general is its diffusion throughout air, water, earths, stones, rocks, &c., that a very able and philosophical chemist, Mr. Hume, regarded it as the great, the universal cement of nature.

The following striking facts should never be lost sight of. *Oxygen* constitutes eight-ninths of the entire volume of all the waters of the globe—oceans, lakes, rivers, the moisture *within* the earth, and the aqueous vapours of the atmosphere being, of course, included. It occupies about one-fifth of the volume of the atmospheric air; and, whether Mr. Hume's suggestion, that *silex* or *flint* is identical with *oxygen* itself, in the solid form, be correct or not, certain it is, that, by analysis, *oxygen* is proved to constitute fifty per cent of that universally diffused substance, *silex*.

In stones and earths it exists in the solid form; in the water it is fluid; but in the atmosphere it floats as a gas, combined with still greater volume of azote.

In the latter condition it is probably in its most exalted electric condition; as is evident by the flash of light which is emitted when, by combination and explosion with hydrogen, water or watery vapour is produced. Again, if a stream of voltaic electricity be passed through water, that fluid is decomposed, and its elements separated in the form of gases, which occupy a volume infinitely greater than that of the water decomposed.

The source, the reservoir of *oxygen gas*, we therefore suggest, must be traced to *water*; and of this more will be said under its proper place. But, as every particle of electricity which passes through water decomposes a certain definite portion, it is fair to infer that the magazine which contains the greatest quantity of oxygen, and in a condition the most aptly prepared for its development, is the fountain from which oxygen gas is chiefly derived.

Oxygen gas possesses, in an eminent degree, the power to support respiration; hence its title *vital air*. Still, though this be true to some extent, no animal could continue to live in an atmosphere of pure oxygen—inflammation or apoplexy must speedily ensue.

With equal energy it supports combustion; thus, a coil of thin iron wire will produce, in a jar of oxygen gas, a fire-work of exquisite brilliancy; and a morsel of red-hot charcoal, which, in common air would

smoulder gradually away, bursts into rapid ignition the moment it is passed into a vessel of the gas. *Combustion*, in a word, is carried on in oxygen with a degree of violence which is incompatible with durability; and herein we trace additional proof of its electrized condition when in the state of an aerial fluid; for, to what agent, excepting it be a latent and masked store of fire, can we refer that effulgence which ever attends the combustion of charcoal, iron, antimony, phosphorus, &c., in a vessel of oxygen gas.

The two *invisible airs*, hydrogen and oxygen, when ignited together with that especial caution which the oxy-hydrogen blow-pipe demands, excite a degree of heat equivalent to that of the voltaic circuit: *lime* may be ignited by it—(see *Phil. Trans.* 1824)—and the light evolved is so intense as to be used as a substitute for that of the sun in the solar microscope! To what can we ascribe these manifestations?

XXXIV. *Pearl-ash—pot-ash—vegetable alkali?* The terms are of every-day occurrence—they have already been considered under the head “Carbonates,” No. XII.

XXXV. *Phosphoric acid and phosphates?* The former exists in bones, combined with lime. When bones are so burnt as to retain their form, and become white by the dispersion of their carbon, impure phosphoric acid is readily obtained by digesting them with dilute sulphuric acid, which, by superior affinity, unites with the lime, forms sulphate of lime, or artificial gypsum, and liberates the phosphoric acid. In the laboratory this acid is extensively employed in the preparation of the neutral phosphates; but in reference to agriculture, the *phosphate of lime*, as it exists in bones, is alone of any immediate value.

A great deal has been written concerning bone manure, and of the soils to which it is most and least suitable. We do not wish to multiply remarks, having already alluded to bone manure; but feel it a duty to refer to, while we recommend, as a really useful compendium, a new almanac, called *The Farmers' Calendar and Diary of Agriculture and Gardening of 1843*. All the new manures are described; but under the article “Bones,” there is a column or two, from which we obtain the following extracts:—

“Bones are now generally boiled before grinding, and the extraction of the fatty matter has not been found to be hurtful to their use”—(query—facts?)—“the principal ingredient being the earthy salt called the phosphate of lime; but with the real fertilizing substance we are wholly unacquainted. Equally good crops have been obtained by using unboiled and boiled, mixed and unmixed, unheated and heated bones, arising, it may be presumed, from a particular state of the soil and

atmosphere, which may be reasonably supposed to control the action of manures of any kind.

"It being now the practice of the bone manufacturers to sell the crushed bone and dust separately, instead of mixed as formerly and most properly, the farmer is now recommended to mix the bones with ashes of any kind, fine earths of all sorts, sawpit dust, rape-cake dust, road-scrappings, and all similar substances that will pass the funnels of the drill machine, and to heat the mass a few days before sowing with caustic lime slaked with urine, and then turn it over several times, and to sow these in a hot state." The writer adds that he "has this year a fine crop of turnips from 16 bushels of bones prepared as above, and from land in a very exhausted state, at a cost of 50s. an acre, after paying 60 miles of carriage. The expense is moderate and profitable, and gives a crop where no other manure could be found. The soil is a cold moorish loam, on a tilly bottom resting on a greywacke formation."

These observations are practical; but, in candour, we must say, that in conforming to the directions given for the application of bones, a farmer will acquire very little knowledge of their individual worth as a manure.

Setting apart the consideration of the matters extracted by boiling, and assuming that phosphate of lime is the chief ingredient, what opinion can be formed of its use or effects when applied in conjunction with coal-ashes, fine earth, saw-dust, oil-cake, and lime as a *wrate*. In the first place, coal and wood-ashes contain alkaline salts, besides silex, chalk, and oxide of iron; earth or loams add some decomposable substances; saw-dust is complete woody fibre, oil-cake decomposable vegetable matter, and lime with urine is a compound specific manure of itself. The whole affair is one of great complexity: the manure so prepared is extremely likely to contain some material suitable to most soils; but how can it be called *bone manure* in the simple acceptance of the term? If we are ever to form a true estimate, we must not complicate and involve our experiments.

XXXVI. *Prussic acid and prussiate of potash?* No inquiry need be made respecting the former, it belongs to chemistry and medicine, is a poison of the most active character, and of no use to agriculture; the only fact of importance that ought to be recollected is this, it is a natural product, and exists in bitter kernels of stone fruit, and in the essential oil of laurel leaves; hence caution is indicated. It also is present in some flowers which sensibly emit the odour of bitter almonds: those of the oleander offer an example. This acid, in the modern nomenclature, is the *hydro-cyanic prussiate of potash*, now called *ferro-*

cyanuret of potassium, is of great consequence, since it furnishes one of the most delicate tests for iron which chemistry has discovered. It can be purchased in some places, but is so easily prepared by any one who has an inclination for experiment, that we prefer to describe a process that will be sufficiently accurate.

Dissolve two or three ounces of good pearl-ash—or in preference, salt of tartar (called sub-carbonate of potash)—in little more than its own weight of water, and pass the solution through a filter of white blotting paper in a glass funnel; dilute the clear liquid with as much more pure water, and if not bright, filtrate it again. Heat the solution nearly to boiling, in a glass or stoneware basin with a lip, over a lamp or burning charcoal, and add, by degrees, Prussian blue in powder, so long as its colour change to an orange-brown; then add a little more in excess to insure the saturation of the potash. Keep the solution quite hot over an iron plate or lamp, and stir the mixture with a strip of glass after each small addition of blue, the quantity of which may be one tea-spoonful.

Finally, pass the solution through paper into a saucer or deep plate, and let it rest. Crystals will soon form, and in a day the fluid may be poured off; they can then be dried upon folded blotting paper.

As to proportions, any weight of carbonate of potash, if pure, will require a third more of Prussian blue. In the above process there will be waste of materials; but the expenses are too small to require any secondary process, the first crop of crystals being always the best.

The rationale is too complex for our present purpose; suffice it to say that the blue furnishes the neutralizing acid and some iron, and leaves an oxide of iron with alumine, in the form of a dark-brown mass, when dried. The crystals, dissolved in sufficient water, will detect the iron of any soil, previously treated with dilute sulphuric or muriatic acid, and filtrated. The clear solution, however weak, will be rendered blue on being even touched with a strip of glass moistened with the prussiate, and this *blue* is genuine *Prussian blue*, free from any of those adulterations which exist in the blue of commerce.

XXXVII. *Sal ammoniac*? The old name for a salt composed of ammonia and muriatic acid, one equivalent of each, or in the proportions of $31\frac{1}{2}$ per cent of the former and $68\frac{1}{2}$ per cent of the latter in the 100 parts. It is of no particular use in husbandry; but its formation is accompanied with some curious phenomena, one of which any person may observe. Ammoniacal gas, as we have before stated, is developed in close stables and dung-heaps; its volatile odour can be at once detected; but so strongly does it attract muriatic acid (spirits of salt) that

if a saucer be just wetted with a drop or two of that acid, so as to expose a broad surface of it, on entering a stable, a cloud of white mist will instantly collect in the saucer; this vapour is a true salt of ammonia, in extremely fine crystals. Its present name is *muriate of ammonia*.

XXXVIII. *Soda—oxide of sodium?* Slight mention has already been made of this mild alkali at No. XII., under the division of *Carbonates*; but it assumes so much interest as to claim a few additional remarks.

Its base is evidently a metal, to which Sir H. Davy gave the name of sodium after his discovery of it in 1808. It is soft, malleable, of the colour and brilliancy of silver, but is so greedy of oxygen that it tarnishes in the open air instantly, and takes fire when heated in it. The product of combustion, or of the slow oxidation of sodium, is *soda*.

As the metal cannot be preserved as such, if exposed to air or water, from both of which it attracts oxygen, it is never found in nature.

1. *Caustic soda*, or soap-ley, is prepared by heating a solution of the crystals of mild soda (carbonate) with quick lime; the lime attracts the carbonic acid, and the alkali then becomes pure, or caustic.

2. *Carbonate of soda* is the crystallized soda of the shops; it consists, according to Bergman, in round numbers, of—

Pure soda.....	20
Carbonic acid	16
Water	64
	100

Hence we perceive that the crystals contain a very large proportion of water. In proof of this, if any given weight of them be crushed into small particles, and exposed on a plate to a dry air, the whole will gradually become a white powder, with a very considerable loss of weight. But it requires a red heat to expel all the water of combination.

3. *Soda* is the base of a very great number of valuable salts; among others, that inestimable natural treasure, common culinary salt, by some so extolled also as a saline manure, and the *nitrate of soda*, now under trial as a powerful adjunct to the manures of recent introduction. Soda is found native in Egypt and other hot climates; but it is always impure, and contains common salt: hence we infer that it is not a primary product, but has its origin in *salt* decomposed and deprived of its muriatic acid by some powerful agency with which we are unacquainted. Rough nitrate of soda also generally contains some common salt, therefore its origin may be considered similar.

XXXIX. *Specific gravity.* Every fluid or solid, according as its particles are more or less compressed (dense), must be comparatively

heavier or lighter than another. To determine the proportion in which one substance, solid or fluid, differs from another, a general standard is required; therefore chemists have assumed pure rain or distilled water as the most simple common measure by which the specific weight of another substance can be ascertained.

As temperature affects the density or compression, it is usual to place the material to be weighed and the water with which its weight is to be compared, in the same situation for some hours, and generally in a place where the temperature is about the average or mean of our climate, that is 55 or 60° of Fahrenheit. But as in common cases and at all seasons it would be inconvenient to attend to minutiae, it will suffice to place both substances in any room or situation where they may acquire the same degree of temperature.

One of the experiments of the greatest utility in the farm is that by which the *decrease* of gravity proves the formation of ardent spirit in home-made wines, beer, and cider. Spirit or alcohol is much lighter than water, and still more so than the *must* of fruit, and the extract of malt and hops, called *wort*.

When, therefore, a family standard has once been assumed, by repeated trials and experience, as, for instance, the weight of a liquid, after adding a certain quantity of sugar to a certain volume of grape-juice and water, or a known quantity of malt and hops to the mash for ale and beer, the *quality* of these materials (as also that of the raw juice of apples and pears) may be correctly estimated. This is the first step of moment, and it will lead to economical results. A second is the knowledge of the progress of fermentation before turning, and subsequently in the barrel; by which a sweet and rich, or a dry and more perfectly laborated liquor may be obtained.

We can now only describe a simple process by which the *specific comparative* gravity of fluids can be ascertained with sufficient accuracy.

A very good pair of scales, of size to weigh half a pound, and which will turn with the weight of *one grain*, a set of apothecaries' weights, and one light glass bottle, with a slender long neck, like that used for capillaire, are essentials. The bottle must be accurately weighed, or rather exactly balanced by weights, and its weight (tare) reduced to grains—480 grains are one ounce—it is then to be filled to the top of the neck, or to a point where a glass stopper, perforated with a very fine orifice, will reach the water, and permit a minute drop to ooze out; being wiped dry, it is to be weighed, the weight of the bottle subtracted, and the nett weight of the water reduced to grains.

The water is next poured off, shaking the bottle repeatedly while

inverted; it is then filled with the juice, wort, or fermented product, and weighed, observing the same precautions.

Both weights being reduced to grains, that of the liquor is to be divided by that of the water, and the product will be the gravity sought. A knowledge of decimal fractions is required, otherwise the calculation cannot be worked out.

XL. *Sugars* of the cane, grape, honey, &c., are products of organic action: there are specific differences in all, and each abounds with a sweet principle not crystallizable, the separation of which is effected by peculiar chemical processes.

Cane-juice is said to contain ten purely *organic* and some *inorganic* ingredients, combined with vegetable acids. All the organic ingredients are resolvable into the elements oxygen, hydrogen, carbon, and occasionally nitrogen. Pure crystallized cane sugar is stated to consist (in the 100 parts) of

Carbon	44.4
Hydrogen	6.2
Oxygen	49.4
	100

We use the words conventionally; for *sugar* contains neither one nor the other of these ingredients: it, like all other organic products, is a peculiar substance which is found to yield, by destructive analysis, the elements alluded to; but by no human efforts could sugar be re-formed by the blending of those elements.

XLI. *Urates*? We read and hear of new manures called urates: properly speaking, an *urate*, like any other chemical word terminating in *ate*, would express a salt, the base of which, whether that be lime, potash, soda, or ammonia, is neutralized by the *uric acid*. But in 1000 parts of urine our analyses discover but 1 of uric acid. Urine contains several salts of ammonia, and much of a peculiar product called *urea*, which speedily evolves ammonia. When lime is added to urine the salts are decomposed, and the ammonia passes away; hence Liebig and others protest against that addition, and substitute sulphuric acid, which would fix the ammonia in the form of a sulphate. Chemistry determines these facts: it remains for agriculture to ascertain their worth and availability.

XLII. *WATER*. Much has been said concerning this once supposed *element*, under the heads *Aqueous Vapour* and *Oxygen*; it only remains, therefore, to notice the theories of two most eminent chemists, Lavoisier and Faraday. The former conferred the name of hydrogen to the gas so called, from the belief that it was the generator or base of water—

(*υδωρ*—water, and *γεννα*—generate). When, however, we reflect upon the immensity of the waters that have existed for all time; and perceive that, by agency of the electric current, a single drop of that water can be converted into oxygen gas, an aerial fluid almost as light as common air, and into hydrogen gas, which, while it occupies twice the space of the former, possesses but *one-eighth part of its weight*; and again, when every experiment enforces the conviction that those portions of hydrogen which are under any circumstances apparent, must be derived from the decomposition of water, we find reason to reverse the theory, and to consider *water as the source of hydrogen*.

From the evidence of all facts and phenomena, the meteorology of nature might safely be referred to the electrolytic disturbance of the elements of water, in and above the earth's surface, and the alternating re-union of those elements.

Dr. Faraday, in his *New Researches*, Jan. 1834, 8vo, p. 215, observed—"I consider the foregoing investigation as sufficient to prove the very extraordinary and important principle with respect to *water*, that when subjected to the influence of the electric current, a quantity of it is decomposed exactly proportionate to the quantity of electricity that has passed." Again, 252—"If a voltaic trough have its extremities connected by a body capable of being decomposed, as water, we shall have a continuous current through the apparatus, and whilst it remains in this state we may look at the part where the acid is acting upon the plates, and that where the current is acting upon the water as the reciprocals of each other.

"The chemical action of a *grain of water* upon four grains of zinc evolve electricity equal in quantity to a powerful thunder-storm!"

We attempt not to impugn the influence of the enormous volume of electricity required to hold the elements of any compound in its natural condition of union; but, we must suggest, that if the passage of an electric stream through water develop its elements in the state of gas, which occupies a space many hundred-fold greater than that water, then it should appear that the particles of the gas are associated with electricity in corresponding proportion! And this theory is justified by the flash of light which is revealed when two volumes of hydrogen and one volume of oxygen (by atomic weight $1+8=9$) explode to re-form that fluid water, which a current of electricity had previously decomposed. Synthesis and analysis thus afford consentient evidence.

J. TOWERS.

February 27, 1843.

WATER FOR SHEEP.

Many farmers provide no water for sheep in winter while they have access to snow; but this is poor management, as sheep require much water while eating dry food, and to eat snow to slake their thirst, is a tedious, unpleasant, unsatisfactory way, in which the animal will not take so much moisture as is necessary for health and good condition.

In summer, sheep will do very well without water, as has been proved by experiments; and we have learned this by years of observation, having frequently been most of the day in sight of the only watering-place in the pasture, and never seeing the sheep drink, nor their tracks around the water. But in the warm season they have moist food, and they usually feed when the dew is on.

If sheep be provided with a good watering place in winter, they will frequent it often, probably oftener than any other animal; and we have no doubt that they will go as far for water as other animals, after they have been introduced to it in a kind and gentle manner.

We have observed that sheep will go and drink in the morning, even to a considerable distance, before they have half done their breakfast; and they generally go to the water several times in the day, while some other animals only go once or twice. This shows conclusively the importance of a good supply of water.

There are but few farmers who have not, at times, been so situated that they have attempted to slake their thirst with snow; and from the unpleasantness of this way, and the small supply thus obtained, when the weather has been very cold, and the snow dry, they can learn the sad condition of poor *Nanny* when reduced to the same extremity. Then, farmers, from your own wants and feelings, learn to pity the poor animals, which will show at once by their actions that they prefer water to snow, and by making them comfortable you will add to their profit, and finally reap the reward of your care.—*Boston Cultivator*.

ROYAL AGRICULTURAL IMPROVEMENT SOCIETY OF IRELAND.

A meeting of this society was held on the 24th February, in their rooms, in Sackville Street, Dublin.

The following members were present:—His Grace the Duke of Leinster, the Most Noble the Marquis of Downshire, Lords Crofton and

Clonbrock, J. L. Naper, Thomas Mooney, James Ferrier, Acheson Lyle, Elias T. Corbally, Barry Nugent, John Mac Neil, T. Filgate, William Stewart Trench, T. C. Trench, Thomas R. Hardy, Charles Richardson, D. J. Wilson, David C. La Touche, Henry Ryan, William Sherrard, David Henry Sherrard, Henry Garnett, W. T. Finn, G. Lambart, James Molloy, Edward Rorke, George M'Carney, Patrick Clarke, Edmund Murphy, Robert Foster, Anthony Hussey, Pierce Mahony, Thomas Hutton, J. Richmond Barry, William Despard, Somers Payne, and Thomas Disney, jun., Esqs.

His Grace the Duke of Leinster was called to the chair.

Mr. E. Bullen, the secretary, read the minutes of the last day's proceedings, and also the following

REPORT OF THE COUNCIL.

The council have to congratulate the society, at the conclusion of its second year, upon the progress it has made in public estimation, as well as in effectually carrying out those objects which were originally put forward as the basis of its institution. In the increased confidence which they meet in every quarter, the general adoption of their principles and views, but, above all, in the widely extended spirit and desire for agricultural improvement, which has lately displayed itself in Ireland, they cannot but see evidence of the practical and beneficial effects they have already produced. It must be also gratifying to all those interested in the welfare of the society to reflect, that notwithstanding the numerous difficulties with which it had at first to contend, its progress has been uniform and undisturbed; every feeling seemed to be merged in the one all-absorbing desire of directing the newly developed energy and excitement into a proper channel, and towards the public good.

In order to promote the objects for which the society was established, the council determined to carry out in detail those plans which were originally laid down for its operations, namely, the establishment of a Great National Cattle Show and Agricultural Meeting, in the four provinces of Ireland alternately, once a year, and the formation and encouragement of local farming societies, in connexion and communication with the central one. In carrying out the latter object, the council have most studiously avoided all direct interference with, or control over, these local societies. This system, they are happy in being enabled to state, has been attended with the best results, each year presenting an increase in the number of these bodies.

In the year 1841 only twenty-three local societies were in connexion with the central one. In the year after the number had increased to fifty-three, and at present there are no less than eighty of these valu-

able institutions in connexion with the central body, to all of which, premiums to the amount of £1030 will be awarded for 1843.

The council beg leave to refer to the premium-sheet of the society for the particulars connected with the list of premiums proposed to be thus given to local societies in 1843, and also to the annual report of the society, which will be published at length for the award of the different local premiums for the past year.

The progress of the society may also be estimated by the number of donors and subscribers in each year since its commencement. In 1841 there were 106 donors, who contributed a sum of £4407 5s. in donations, and 379 members, who contributed £794 1s. Od. in annual subscriptions. In 1842, £360 were received for additional donations, and £963 13s. from 512 annual subscribers. Most of the original donors have also given annual subscriptions, as it is a fundamental rule of the society, that all persons should pay an annual subscription of £1 at least, in order to continue members. The annexed statement of the finance committee will afford full information on this subject, and to which the council refer.

In estimating the effects the society has already produced upon the general state of husbandry and agriculture in Ireland, the council beg to direct attention to the proceedings of the different Local Farming Societies in connexion with it during the present year. In these proceedings, the strongest testimony is borne to the beneficial effects produced by the Central Society, not only by the premiums which were awarded to each locality, but by the stimulus and excitement which agricultural improvement has received, within the immediate sphere of these particular bodies. A correct and detailed compendium of the views and sentiments of these local societies will be carefully collected from their reports, and the communications of their secretaries, upon the state of agriculture in the different districts, and published in an appendix to the printed report for general circulation.

In order to encourage the formation of local societies, and to stimulate the exertion of those already in existence, the council determined upon continuing the same amount of premiums to each of the eighty local societies in connexion with the central one in 1842, that they allotted to them last year, that is, £10 for each, and three medals, making a total of £1030 granted in premiums to local societies for 1843. They have also confined these money-premiums to the encouragement of green crops, draining, and husbandry, as will be seen on reference to their premium-sheet, thereby establishing an ample ground for general inspection, by competent judges, at the period of the local meetings during the present year.

By a rule of the society all the money-premiums then given to local farming societies are also confined to working farmers living by husbandry, and holding under 25 Irish acres, or 40 acres English statute measure. The medals or honorary rewards of the society for stock, green crop, and draining, being open for competition to all members of each local body at large. The propriety of this rule has been much questioned, and applications have been made from different quarters to extend the limits within which the money-prizes are thus awarded. It appeared, however, to the council, on mature consideration, that, considering the small amount of the sums allocated to each society, and that the premiums at the great cattle show and the honorary premiums of the society are open for competition to proprietors and farmers of every class (thereby virtually excluding the smaller class of farmers), it meets the original views and objects of the society best, thus to confine the money-premiums to this class of farmers exclusively, and to leave the gentry and larger classes to compete for the society's honorary rewards, and for the premiums distributed by their own local institutions. In coming to this resolution, the council are aware that they will not satisfy all parties, but they consider forty English acres as a fair average of that class of working farmers in Ireland, which requires the peculiar aid and assistance of the society.

The leading feature of the society's proceedings last year was their first great Annual Cattle Show at Cork, on the 21st of July. The particulars of this great meeting appeared at the time in all the leading journals of the country, and its details will be stated in full in the society's yearly report, including a correct list of the prizes awarded on that occasion. The Marquis of Downshire presided, in the unavoidable absence of His Grace the Duke of Leinster, president of the society; and the society is much indebted to the noble Marquis, not only for the mode in which he discharged the laborious duties of chairman at the banquet, but also for his unceasing exertions on all occasions to promote the objects of the society.

By a most advantageous arrangement with the gentry in the province of Ulster, the society are enabled to hold their next Annual Cattle Show in Belfast for 1843, under most favourable circumstances; for particulars of which, they refer to their premium-sheet; and after consulting all parties on the subject, the council have determined to recommend that the time for the cattle show at Belfast should be fixed for Thursday the 31st of August.

In awarding the society's premiums for essays and reports, and also

to the competitors for draining, planting, reclaiming waste lands, &c., the council have been most careful not to give their sanction to proceedings and documents, which might not possess the necessary qualifications, or be otherwise of sufficient intrinsic worth. For this purpose they refrained from awarding the prize of fifty sovereigns given by Lord Cloncurry, for the best agricultural grammar or essay on manures, none of the claimants for that prize having, in their opinion, complied with the terms of the specification, or been otherwise deserving of merit. They have awarded the society's medal for the best essay on manures, to John Sproule, Esq., of Castleknock; the medal for the greatest quantity of draining effected during the years 1841 and 1842, to William Forster, Esq., of Ballinure, Clones.

They have also continued similar prizes for the present year.

The medals which were placed by the society at the disposal of the Society for promoting the growth of Flax in the north of Ireland, were, after much competition, awarded as follows:—

For the best and highest-priced sample of flax sold in the Armagh market—the medal was awarded to Mr. Alexander Baird, Jamison's farm, Killalea.

For do. do., sold at Newtownlimavady—the medal to Mr. George Herriott, Tuibaggan Glebe, Newton.

For the best specimen of flax, cleaned and handled in his own mill—the medal to Mr. John Murrell, Milbrook, Newtownlimavady.

For the best sample of flax shown at Rathfriland—the medal to Mr. David Linsay, Ballyaughlin.

For the best specimen of scutched and hurdled flax ditto—the medal to Mr. Robert Swan, Grallough, Rathfriland.

No returns have been as yet received from the other towns.

The council refer with pleasure to the friendly intercourse that has been established between the society and the other national institutions, both in England and Scotland. Deputations from the Royal English Society and the Highland Society of Scotland having attended the first meeting and cattle show in Cork, and similar deputations from this society having also attended the meetings at Bristol and Edinburgh last year. Communications have been also received from the Boards of Agriculture in Nova Scotia and Newfoundland, soliciting co-operation and mutual intercourse, and these two bodies have been accordingly added to the corresponding societies, in connexion with the central one.

LEINSTER, Chairman.

1843.] *Agricultural Improvement Society of Ireland.* 79

Mr. Lambart, chairman of the finance committee, next read the statement of accounts :—

STATEMENT OF THE RECEIPTS AND EXPENDITURE OF THE ROYAL AGRICULTURAL
IMPROVEMENT SOCIETY OF IRELAND,

From the period of its formation, on the 18th of February, to the 31st December, 1841.

1841.	RECEIPTS.		
	By amount of donations received, as per detailed list.....	£4407	5 0
	„ Amount of annual subscriptions re- ceived, as per detailed list.....	794	1 0
	Total donations and subscriptions for 1841..	£5201	6 0
	„ Half year's interest, ending 10th October, 1841, on £4025 4s. Invested in £4027 4s. 3d., 3½ per cent, Government Stock.....	70	9 7
		£5271	15 7
1841.	DISBURSEMENTS.		
	To newspaper advertisements	£179	10 9
	„ Stationery	50	19 5
	„ Postage, carriage of parcels, &c.....	35	13 0
	„ Printing	44	11 0
	„ Book-keeper, up to 6th July	36	0 0
	„ Office furniture	22	5 6
	„ Office and house expenses, sundries, &c.....	18	16 4
		387	16 0
	„ Less £100 paid by Peter Purcell, Esq., and still due to him	100	0 0
		287	16 0
	„ Premiums to 23 local societies	138	10 0
	„ Secretary's salary, 3 months ending 31st August, 1841	37	10 0
	„ Rent of rooms from July 19 to Decem- ber 31, 1841.....	31	6 6
		68	16 6
	„ Amount of cash in bank to credit of donation fund.....	337	17 6
	„ Ditto in bank to credit of Finance Com- mittee	338	16 1
	„ Ditto cash in Messrs. Coutts' bank, London.....	38	0 0
	„ Ditto in hands of secretary	36	13 0
		751	6 7
	„ Amount of stock purchased in the new 3½ per cent stock	4025	4 0
	„ Bank pass book	0	2 6
		4025	6 6
		£5271	15 7

80 *Agricultural Improvement Society of Ireland.* [APRIL,

From 1st of January to 31st December, 1842.

1842.

RECEIPTS.

By balance in bank since 1841	£751	6	7
„ Amount of donations received in 1842..	360	0	0
„ Annual subscriptions ditto	963	13	0
Total donations and subscriptions for 1842, as above .	1323	13	0
„ One year's interest on government stock, to 10th October, 1842.....	151	14	0
„ Received from the County of Cork Farming Society, towards defraying amount of premiums and ex- penses of Cattle Show at Cork	500	0	0
	£2726	13	7

1841.

DISBURSEMENTS.

Residue of disbursements for 1841.

To balance due to Peter Purcell, Esq., for primary disbursements for 1841 (see balance sheet for that year).....	£100	0	0
„ Printing report for 1841	36	18	5
„ Die for society's medal, design and spe- cimen medals	47	15	0
„ 31 medals to local societies, engraving and cases for same.....	20	16	8
„ Balance of secretary's salary, five months, ending December 31, 1841..	50	0	0
Total residue of disbursements for 1841.....	255	10	1

Disbursements for 1842.

To Newspaper advertisements	50	17	6
„ Stationery	18	8	4
„ Printing	13	0	0
„ Postage and carriage of parcels	47	12	8
„ Writing clerk	12	0	0
„ Secretary's travelling expenses to Cork and Belfast.....	14	5	0
„ Office furniture	6	0	0
„ Office expenses, servants, coals, &c., for one year, ending 31st December, 1842	15	13	11
„ Incidentals, sundries, &c.....	5	3	0
	183	0	5

Expenses of Cattle Show at Cork.

„ Judges	63	0	0
„ Clerk of the show-yard.....	15	0	0
„ Expenses of secretary and staff	15	0	0
Premiums awarded at the cattle show at Cork.....	448	0	0
„ Medals at ditto	32	11	8
	480	11	8

Local Societies.

To Money premiums awarded to 53 local societies	£380 10 0		
„ Medals to ditto	70 11 0		
		451	1 0
„ Secretary's salary, one year.....	150 0 0		
„ Rent of premises, ditto.....	70 0 0		
		220	0 0
„ Invested in government new 3½ per cent stock		738	1 0
„ Balance in bank to credit of donation fund	14 0 0		
„ Ditto to credit of finance committee ..	282 9 1		
		296	9 1
„ Cash in secretary's hands		9	0 4
		£2726	13 7

GUST. LAMBERT,
Chairman Finance Committee.

Feb. 22, 1843.

The Marquis of Downshire said that before he moved that the report be adopted he begged to ask a question of Mr. Bullen. He wished to know whether the council had taken into their consideration the suggestion made by Mr. Blacker with respect to employing agriculturists, or giving employment to any persons who employed agriculturists, either on districts or upon private property?

Mr. Bullen replied that the council had taken Mr. Blacker's plan into their consideration, but they conceived that the want of means, save by encroaching upon their funded property, presented an obstacle to carrying it out which was insurmountable.

The Marquis of Downshire asked if premiums were offered to any persons who would employ agriculturists?

Mr. Bullen replied in the negative.

The Marquis of Downshire then said that he felt great pleasure in attending there that day, and also in moving that the report and statement of finance he adopted and printed in the annual report for circulation. He begged to say a few words in making the motion. In the first place, he begged to say that he had watched with the greatest pleasure and attention the progress which the society had made for the last two years. He did not speak his own opinion merely, but the opinion of a great number of gentlemen of large property, who were convinced that the society was calculated to do great good to all parts of Ireland. Actuated by this view, he appeared that day at the meeting to indicate his anxiety to support the excellent objects of the society. With respect to himself, personally, he was much obliged to the council for introducing his name in reference to the part he took at the last

meeting for the county Cork. In fact, anybody who attended that meeting could not do otherwise than exert his abilities, humble though they might be, to forward so beneficial an object as that contemplated by it; for he never saw, upon any occasion, such a manifestation in favour of a great and useful measure as upon that, for the feeling of desire to promote their objects prevailed every one present. The place in which the meeting took place was also peculiarly suited for it; it would be difficult to find any city where such a society could be so well accommodated as in Cork. Every one connected with the large corn-market showed his desire to make the meeting do credit to the south of Ireland; and everything—the enormous size of the buildings—the accommodation of every sort which was provided—the determination of the farmers to render the meeting important and productive of good results—and the great liberality and kindness of the Mayor and Corporation—conduced to make it a very useful and gratifying manifestation. With regard to himself, he said that he would never forget their kindness; and the gentlemen who came from England to attend the meeting were delighted beyond measure with the hospitality of those who welcomed them in Cork, as the farmers seemed to think that after having given everything to the strangers, they really seemed disposed to ask them if they could do any more for them. This was the reason that he took the liberty of suggesting an earlier meeting than the month of August, in order that they might meet the English Derby meeting, and come in between that meeting and the Scotch. But there were gentlemen who were more acquainted than he was with the time of holding the assizes, and although he was desirous that the meeting should take place in July instead of August, he now most cordially concurred in the selection of the 31st of August, the more particularly as the Duke of Leinster, an old friend and relation, had kindly said he would attend the meeting. He was sure that the same feeling which prevailed in the south would prevail in the north, and that all the provinces would co-operate to render the meeting effective and beneficial. The society had very handsomely promoted and supported very important objects by the premiums which they offered, but the most important of all was the drainage of the land—not merely for the sake of drainage, but the carrying out of the important objects of Mr. Smith, namely, the deepening of the soil for the purposes of agriculture. They need not waste time in discussing the question of drainage—if they deepened the soil to sixteen inches, it would be a proof that it had been drained, for they could not deepen without draining it. The plan of the society in offering premiums had been taken up by all the north. It was impossible to ride

through Down, Antrim, or Armagh, without seeing the farmers volunteering to adopt the plan of the society. With respect to the expense of draining upon Mr. Smith's plan, undoubtedly if a gentleman employed a labouring man he should pay the expense—it should come in actual money from hand; but the farmers were differently circumstanced, and he entreated the meeting to consider the necessity of every gentleman explaining to his tenants the necessity and wisdom of drainage and the many opportunities afforded to the holders of small portions of land of draining it at a comparatively small expense. He need not detain them any longer than merely while he repeated that he had great pleasure in attending that meeting, and in observing the way in which their proceedings were carried on, apart as they were from other objects, views and feelings, but the soil of Ireland. It was to him a source of great pleasure that the society was progressing steadily and well, apart from all political objects, and those feelings which had, perhaps, disturbed Ireland too much and occupied too much the Irish attention. That was a mutual ground upon which all could meet; and he for one was happy in being able to promote the objects which they all had in view.

John Macneill, Esq., felt great pleasure in seconding the resolution proposed by the noble Marquis. He had left him, (Mr. Macneill) in fact, nothing to add, and but one trifling matter occurred to him, which he would occupy their attention with for a few minutes. In the beginning of December he (Mr. M.) found a good many of his tenants unoccupied, when he talked to them upon the benefits of subsoiling, they all said they had not horses enough to enable them to carry it into practice on their farms. It then occurred to him he could show them how to do it with the spade, for which purpose he called them together and set them to work on 17 acres of his land, upon which he taught them how to trench 17 inches deep in ten days. His (Mr. Macneill's) object in mentioning the matter was to show small farmers that they could effect this most desirable object by draining a small patch of their ground one year, and trenching it upon the following, that would improve the land more than they (the landlords) could with a plough. It certainly might require more time, but it brought a thing (which was otherwise impossible) within the reach of the small farmer. He (Mr. Macneill) also mentioned this subject in order that if the society should think fit they might consider the propriety of adding a premium for the best trenched farm of a certain size, having been first drained upon the plan of Mr. Smith, of Deanston. He (Mr. Macneill) had much pleasure in seconding the adoption of the report just read, and hoped he would be excused for occupying their time so long, but he considered his sugges-

tion might produce a good and beneficial effect throughout the country if properly encouraged and brought into general operation.

Peter Purcell, Esq., the honorary secretary, begged leave, before the resolution was put from the chair, to make a few observations. It was not only necessary that the agricultural society should make a useful application of the money with which it was intrusted, but it should be made use of economically and to the best advantage. He (Mr. Purcell) lately received the report of the English Agricultural Society, of which he was a member, and from which he made a few extracts, with a view of showing the economy pursued by that society, without being for one moment supposed to draw any invidious comparisons. The reports of that society afforded him an opportunity of showing the contributors to the Royal Agricultural Society of Ireland, that their council and committee had been very prudent in the application of the funds at their disposal upon which alone depended their future success and prosperity. It would also show them that what they had been doing was just and honest. In 1841, their expenses for the year only amounted to £543. 11s. 4d., which included a great number of extras not required subsequently, while the same charges in England were £2316. For the last year, 1842, up to the 31st of December, their expenditure was greatly decreased, not having exceeded £403. 5s., which included rent, salaries, printing, stationery, advertising, and many other miscellaneous items, while the expenditure for the same period in England amounted to £1971, which only included the same services and expenses. Independent of this sum there was also an expenditure of £1520 in the year 1841, for their quarterly journal, which was, without any doubt, a work of very great value and benefit to the practical agriculturist. Although very valuable it had so far proved extremely unprofitable to the English society, and they would do well to avoid such an outlay for the present. At the late meeting at Cork their expenses over the receipts were only £93, while in Liverpool, at the same period, the English society's expenses amounted to £946. 3s. 11d. As the expenditure bore a fair comparison upon these points, he (Mr. P.) would now show they had been prudent and economical elsewhere. The amount of premiums given by the English society in 1840, was £765, and by this society last year, £931. 12s. He felt great satisfaction in exhibiting those accounts to the public, because nothing would insure more confidence for their institution than to show a proper and economical application of the funds of the society.

Pierce Mahony, Esq., supported the proposition of Mr. Macneill for subsoiling with the spade by small farmers, and stated that he had put

the plan into effect upon his property in Kerry some time back, where he found it of considerable advantage.

The resolution was then put from the chair and unanimously adopted.

Lord Crofton proposed the second resolution, which nominated officers for the ensuing year.

David Latouche, Esq., seconded the motion, which was unanimously adopted.

Sir P. Nugent moved the third resolution, which was a substitution of members of the council for a similar number who ceased to act. He referred to the necessity of the council, by its energy and assiduity, setting an example to all the local societies.

James Ferrier, Esq., seconded this resolution, which was also unanimously carried.

J. L. Naper, Esq., of Loughcrew, proposed the fourth resolution. He felt extremely grateful to the society for the high honour it conferred on him by re-electing him to his former station in the management of that society. It was very gratifying to him to hear of their increasing success, which was able to bear a comparison with the English Agricultural Society, of which he (Mr. N.) had the honour of being a member. He was sure that comparison was thrown out not for the purpose of finding fault, but in order to stimulate the Irish society to continue in its present successful state.

Acheson Lyle, Esq., seconded the resolution. He felt highly honoured at finding his name introduced amongst the council of the society for the ensuing year, and no exertion upon his part should be wanting in order to assist in working out the details in a beneficial manner. He would give his attendance as frequently as possible while in office, upon which alone—the regular attendance of the officers—the success of every such institution depended.

The Hon. Charles James Trench proposed the fifth resolution, which was seconded by Henry Ryan, Esq., and unanimously adopted.

George Macartney, Esq., proposed the sixth resolution, appointing the 31st of August for holding the annual meeting in Belfast, which was seconded by Thomas Hutton, Esq., and carried.

The secretary announced that subscriptions for the present year were due, which he would be ready to receive, at the society's office, daily.

J. L. Naper, Esq., was then called to the chair, when

James Ferrier, Esq., proposed a resolution, which was seconded by Thomas Mooney, Esq., expressive of the thanks of the meeting to his Grace the Duke of Leinster, for his dignified conduct in the chair

that day, and for his constant and zealous support of the society at all times.

The resolution was passed by acclamation, and the meeting separated.—*Farmers' Gazette*.

THE WEEDS OF AGRICULTURISTS.

[From "The American Agriculturist."]

In looking over the last *Cultivator*, I perceive that one of their correspondents has commenced a series of communications which may prove very useful to our brethren everywhere. The design is to describe what he calls "*the weeds of agriculture*," and to suggest the means of extirpation.

This scheme has put a crotchet into my head, to try my hand at describing—not the weeds of *agriculture*, but those of *agriculturists*; for, unless *they* can be first extirpated from our *minds*, it will be to little purpose for any one to tell us how we are to do with any of the kinds of weeds which infest our *lands*; the mental weeds will render all such information utterly useless.

In executing my project, I will endeavour to put on, at least, the appearance of some classical learning, since it is so much the fashion with writers of the present day, even when they address persons who have not a particle of it; and I shall, therefore, give your readers at least one foreign-lingo name for every mental weed I attempt to describe.

The first in my catalogue is *Inscientia*,—in plain English, ignorance, or want of knowledge. Whilst this preoccupies the field of the mind, no really useful mental plant can take root or grow therein, any more than such plants as sustain animal life can flourish in a soil which is filled with weeds either utterly unfit to eat, or deadly poisonous. It produces intellectual blindness, a disrelish for all wholesome mental food, and an inability to distinguish the good from the bad. The method of cure is—first, thoroughly to convince the sufferer of the true condition of his mind; and then to inspire him with an anxious abiding desire to cure himself. This is a most arduous task; but one which must be undertaken by every intelligent farmer who sincerely desires to relieve from the curse of ignorance all such of his brethren as labour under it.

The next weed in my catalogue is *Pertinacia*, or obstinacy. This almost always grows alongside the other, and is still harder to extirpate, for its roots are so strong and deep, its branches so much upon the *noli me tangere* order, that the most skilful investigator of such matters has never yet, I believe, discovered any method of rooting it out. Among

the plants with which we agriculturists have most to do, there is not one that resembles it so much as our wheat when it takes what is called "*the stud*," and will move neither forward nor backward. The only chance of cure is, when it brings its victim into some intense suffering which forces upon him the conviction that it was caused solely by his persisting in some opinion or practice of his own, contrary to the opinions and practices of everybody else. Even then, the relief (if any) is but too often only temporary; for this weed seems, in some minds, to be as natural and ineradicable a growth as the next that I shall notice. This is *Philantia*, or self-conceit; than which, there is not in the whole catalogue a greater poisoner of the mental soil, nor one that more unfits it for the reception of any good seed. In fact, it disdains and rejects all attempts to impart them; for the sufferer from this cause can hardly ever be made merely to suspect that he suffers at all; or that any one knows, or can possibly know, even half as much as he does, about any business in which he happens to be engaged. Nobody's experience but his own is worth a button to him; he looks upon himself as "*omnibus impar*," up to anything he chooses to undertake, and far above being instructed either by men or books. That droll, quaint, and most amusing old writer, Burton, thus describes *Philantia*, in his "*Anatomy of Melancholy*."

"This pleasing humor—this soft and whispering popular ayre, *Amabilis insania*,—this delectable frensie, most irrefragable passion, *Mentis gratissimus error*,—this acceptable disease, which so sweetly sets upon us, ravisheth our senses, luller our soules asleep, puffes up our hearts as so many bladders, and that without all feeling, in so much *those that are misaffected with it never so much as once perceive it, or think of any cure*."

I would give you still more on the same topic, from this truly original writer, together with his numerous and admirable illustrations of the effects of self-conceit; but neither time nor the limits of my letter will permit.

The two next mental weeds which I will notice, although entirely opposite in their effects, are equally injurious—equally hard to eradicate. Their Latin and English names are so much alike, that I shall call them only by the latter—*Credulity* and *Incredulity*. The effect of the first is to dispose the mind to a constant change of seed, without the power to discriminate between the good and the bad; and to suffer none to grow long enough to ascertain its real properties. The operation of the second is to keep the mind in what an illiterate blockhead of a congress man, whom I formerly knew, used to call "*the state of statu quo*." In other

words, it causes the mind to reject seed of every kind but that of its own choosing, and to which it has always been accustomed. Every new thing it derides without examination, or treats it with the utmost scorn and contempt.

The last weed in my catalogue is *Sagnitia*, sloth, or laziness. This operates on the mind nearly as dead palsy does on the body. For, although the former is not deprived of all sensibility, as is the latter, yet the mental feeling is so slight, even from the most stimulating appliances, that no sensible effect scarcely ever flows from them. If good seed are received at all, they will scarcely ever be sown; but if sown, they will never be cultivated in any such a manner as to render the least service, either to the owner or to anybody else. In short, the mind infested with this weed soon becomes nearly as incapable of intellectual effort as an oyster, and falls into a condition quite as hopeless as if it were at the same time filled with all the other weeds which I have described. Nothing but great bodily suffering will impel it to action, and as soon as that suffering is relieved, it instantly collapses into its former state of utter listlessness and torpidity.

You, gentlemen, and the rest of your brother editors throughout the United States, who have so laudably devoted yourselves to the great cause of American husbandry, and to whom I most cordially wish every success which your hearts can desire, may write and print to the end of your lives in behalf of that cause; but you may rely with absolute certainty upon what I now say—that, unless you can discover some method to rid our minds of all the weeds I have been labouring to describe, your efforts will have far less success than they well deserve to have. Just as soon might you expect to teach an elephant to dance on a tight rope, or to make a honest man of a thorough-bred politician, as to make good farmers either of the wilfully ignorant, the obstinate, the self-conceited, the credulous, the incredulous, or the confirmed victims of sloth. Very few of them are within the reach of any curative medicine which agricultural papers can administer—for the very best reasons in the world, they will not read them. And were it possible to ascertain their present numbers, I fear we should find that, take them all together, they constitute little, if any less than one-third of our whole class.

And now, Messrs. Editors, in bidding you farewell, permit me to assure you very sincerely, that I have no such feelings of paternity for this communication, nor shall I have for any other, should I ever address you again, as would lead me to desire its publication, unless you yourselves should really deem it worth publishing. On no other condition whatever do I wish to appear in your paper. I must therefore beg you

to rest perfectly assured that its non-admittance therein will "break no squares" between yourselves and your agricultural friend,

EXAMINER.

July 16, 1842.

[NOTE BY ED. AMER. AG.—We can assure our friend Examiner, who, by the by, is one of the most distinguished leaders in the agricultural improvements of the present day, that nothing is more appropriate for the community than his home-thrust description above, of the *mental weeds* that oppose such peculiar obstacles to agricultural advancement. But we can hope to eradicate them only by the *inductive* process. *What has not been reasoned in, cannot be reasoned out.* The only chance of success with them is, that the practices and improvements of their neighbours who do read and have capacity to apply their information, will gradually take the place of their own. When they find those who have commenced under the same circumstances as themselves, by a more enlightened and judicious system of tillage, crops, new and improved varieties of seeds and animals, are getting rich while they are growing poor on their old and favourite systems—then, and then only can we hope to move them to the adoption of a wiser course.]

AGRICULTURAL HINTS, METHOD OF PRESERVING POTATOES, &c.

SIR,

In your last Magazine you did me the honour to insert a letter, in which I pointed out means by which I thought agriculture might be advanced. I will again trouble you to give me leave to state some other hints with the same object. I have lately ascertained a method of keeping some kind of garden alleys clean, which is this:—though there may be grass upon them, to rake the surface hard with a short-toothed hand-rake, then water what you have raked, and by that means convert the surface into a puddle; afterwards rub it with a shovel, and it will be converted into a state of mortar; then sand the smooth surface over. This work may be repeated at intervals, and must have the effect of keeping down weeds.

Now it occurs to me, that, by means of a road water-cart, rakes, and rubbing-boards, worked by horse-power, the plan might be made available for the purposes of agriculture; as possibly it might be an easy way of cleaning and subduing the surface of land of its grass; so that manure might act upon it more effectually, and be otherwise applicable—and, had the Royal Agricultural Society of England an experimental farm, I should, I think, make bold to recommend their testing the plan by the trial.

Should not the present age be an era in the enlargement of the farm-buildings of the country?—for, unquestionably, the Carnarvon slate does not require so much timber, and will admit being laid several degrees

nearer the horizon than the heavy brown stone and other covering for houses, and the interests of agriculture call for experiments, as regards the use of these different materials. In your geological surveys I dare say you have witnessed seams of sand among other strata, through which water has filtered for ages, and you may be aware how difficult it is to get sand and clay to mix. Now, could numerous narrow drains, say two or three inches wide and six or ten deep, be made in some tenacious land, and filled with sand, would it not be of use? Possibly the hint might be worth an experiment. Such drains, I suppose, might in some lands be made with the plough.

Agricultural societies do not notice the weight and measure of the cattle which obtain their prizes—would not it be advantageous and satisfactory to do so?

With respect to the method I adopted in preserving the sample of potatoes I sent you, which were found on your cooking them to retain their original flavour, I think I can say it is easy and cheap. I first cut the raw potatoes into slices, then lay as much loose salt on the moist surface as it will take, and put them into a basin over night; the salt in that time, or perhaps sooner, will act on the potato, render it flaccid, and separate the watery part from it. In the morning I then put the slices to boil for four or five minutes, place them in a paper bag, and hang them near the kitchen fire; and, in the course of time, they become converted into that hard and glutinous state you received them in. In answer to your remark, I beg to say the method originates with,

Sir, your obedient servant,

CADOGAN WILLIAMS.

BRIDGEND,
March 9, 1843.

PROBUS FARMERS' CLUB.

EFFECTS OF BONE-DUST ON HEATH LAND.

In consequence of the severe weather which occurred at the late anniversary of the Probus Farmers' Club, the members were prevented from visiting the farm of Carnwinick, and examining the improvements made thereon as intended; and, accordingly, Thursday, the 26th of January, was appointed for this purpose.

This farm is the property of C. H. T. Hawkins, Esq., and is under the management of Mr. Trethewy, of Trewithin. Previous to the year 1835, it was a barren waste—heath and furze being the only covering

of the soil; and it had been let for *two shillings per acre*. Some attempts had been made to cultivate small portions of this waste, about twenty-one years since, using lime as a manure, but without success. In the spring of that year, Mr. Trethewy resolved on trying the effect of bone-dust, which had just been introduced into the county, by Mr. Strong, of Exeter; and, accordingly, some few acres were broken and sown with turnips, one portion of which was manured with bones, at the rate of three-quarters to the acre, the price then being 17s. per quarter. In the years 1836 and 1837, it was cropped with oats, and then laid down to pasture up to the present time.

The attention of the members of the club was particularly drawn to this field. The portion where the bone-dust had been used had a most luxuriant appearance, whilst the other part exhibited a state of the greatest sterility. It was as if a line of distinction had been drawn between rich and scanty herbage—between a green meadow and a barren soil; and we understand that the effect of the bone-dust was as perceptible in both crops of oats as it is in the pasture at the present time.

In the year 1836, Mr. Trethewy broke up another piece of the waste, which was sown with oats; and on the following year a similar crop was taken, using as a manure for about one half only, two quarters of bone-dust to the acre, sown broad-cast, after which the whole was laid down to pasture. We understand that where the bones had been used, the crop of oats was particularly good; and at the present period, the line of distinction on the pasture is so perceptible, that the effect of the bones might be seen at almost any distance where the eye could reach, and from all appearances will remain so for years to come.

This was a convincing proof to the members that bone-dust was not only valuable for a present crop, but that it was a manure that left its durable effects on the soil beyond every other kind.

Other similar cases were shown us, where the same beneficial effects had been experienced, in two patches particularly, one being broken in 1837 and the other in 1838. They had been sown with turnips, and manured with bone-dust, which produced most excellent crops; after which a crop of oats was taken, and then pastured, up to the present period. And in another piece of about six acres, which was broken in 1839, and sown with Swede turnips, an excellent crop was produced; since which, other crops have been taken, and the clover at the present time is very luxuriant, and equal to land let at 40s. per acre.

In 1840, another piece was broken and sown with turnips, with bone as before, and oats in the following year; both crops were excellent. In November, 1841, it was ploughed once only, and without any other

cultivation sown to turnips in June, 1842. This crop was also good, and plainly proved that turnips after grain may be produced without either spring or summer ploughing. In 1841, another large portion was broken, sown with Swedes and afterwards cropped with oats, using the bone-manure only, which answered as well as before; and last year, another piece of six acres was broken, four of which were sown with Swedes, and manured with bone-dust. The members of the club acknowledged that this was decidedly the best crop of turnips which they had seen for the season.

The general plan adopted by Mr. Trethewy through the whole period had been to consume about one-half of the turnips on the land, by folding sheep thereon, whilst the remaining half was carted to the farm-yard for the cattle. In a few instances, in order to test the value of some other manures against the bone, he has instituted experiments on small portions of the different fields, with Lance's, Poittevin's, and Clarke's manures, the urate of the London Manure Company, and guano, all of which he found to be extremely useful, though failing evidently in their durability on the land.

The estate of Carnwinick is about 100 acres, 50 of which Mr. Trethewy has thus brought into good cultivation, since 1835, in the manner we have described. Its general appearance is that of patches of verdure and sterility—the cultivated portions strongly contrasting with the uncultivated ones, and the naked and barren waste of Trelyon common adjoining.

In the farm-yard, there were twenty head of cattle feeding on turnips, among which were a few tolerable specimens of the Devon breed, some good specimens of a cross between the Devon and the short-horn, and four of the West Highland breed—a hardy race, possessing great aptitude to fatten, and well adapted to some of our mountainous districts. In addition to the members belonging to Probus there were several practical agriculturists from the adjoining parishes also present, who expressed themselves not only pleased at what they saw, but surprised at the improvements which had been effected in so short a period, and at so trifling an expense—an expense evidently within the reach of every farmer, since there was a decided profit produced on the outlay even on the first crop, whilst the land in appearance was equal to the same let at from 20s. to 30s. per acre. The soil lies on the clay-slate rock, and may be considered as a fair average of the commons and downs lying on the same stratum, in the parish of St. Stephen, which might be all brought into a similar state of cultivation by the same means.—*Mark Lane Express*.

ON THE GENERAL MANAGEMENT OF LAYERS,
*Both as Regards the Growth, and Preparation for Market, of
 Clover and other Small Seeds.*

BY MR. SAMUEL TAYLOR.

Few things are of greater importance in the culture of arable land, than a strict attention to the minutiae of the management of small seeds: I mean, by this, the choice of seed, the preparation of the land for sowing; attention to cleanliness during growth; and the dressing and cleaning the produce for market.

I do not here undertake to concoct the best mixture of grasses wherewith to form what in Norfolk we call a layer, or in other districts, and, perhaps, with greater propriety, a lay; because that is a point which must be regulated chiefly by the nature and quality of the soil, or, if books are resorted to, ample hints may be obtained from Loudon's *Encyclopædia of Agriculture*,—C. W. Johnson's *Farmer's Encyclopædia*,—Young, Dickson, and many other writers on *Practical Husbandry*. But, probably, the best and clearest treatise on the subject of seeds is to be found in the *Hortus Gramineus Woburnensis* of my late excellent and indefatigable friend, George Sinclair. The experiments therein detailed, and which exhibit a degree of patient investigation rarely to be met with, furnish a manual of grass husbandry very difficult to equal, and impossible to excel; either for minuteness, or clearness of detail. Referring the scientific farmer to this valuable work, as to a voice which "though dead, yet speaketh," I proceed to discuss the question in the order in which I have already arranged it, of necessity briefly, but I hope practically, and by consequence usefully:—

1. *The Choice of Seed.*—By far too little attention is paid to this branch of the subject by farmers in general—many—I fear I might almost say the majority, are in the habit of doing the *best* they can for the buyer, and are content to do *second best* for themselves; in other words, to take to market their prime seeds, and to make use of their seconds on their own farms; a species of penny wisdom, and pound folly, by no means in accordance with my ideas of good and sound management. True, I may be told, as I often have been told, by these *secondary* practitioners, that the seeds thus reserved for "home consumption," though not altogether so plump as the bulk of the crop, are just as clean, and, with a trifling addition to the *quantity* of seed sown,

as *safe* to use as the best. Sir, it is this doctrine that I venture to combat on the present occasion; a doctrine I make bold to say, neither sound in theory, nor tenable in practice. An addition, they tell us, must be made to the quantity sown, an ugly admission; because the seconds being smaller than the head seeds, there must *already* be a far greater *number* in a given measure, of the former than of the latter quality. The only conclusion, therefore, we can draw from the practice is, that it is a clumsy attempt to make up by quantity, what is wanted in quality; a direct acknowledgment of inferiority in an essential point. But *is* the want of *quality* remedied by *quantity* of seed? Experience bears out no such theory. On the contrary, I have no hesitation in denying the inference altogether. I have conversed with many seed-merchants of great respectability and experience, who, one and all, agree in stating, that from certain farmers they invariably obtain seeds of an uniform good quality; vastly superior to the general runs produced by their neighbours. On analyzing such cases, it has always been found that great and habitual attention has been paid to the selection of the seed of which this is the produce. Charity, we are told, begins at home; and, in like manner, rely upon it, that celebrity on this important point must begin *at home* also. Is not this reasonable, and consistent with common sense? Who that sets up as a breeder of cattle, or sheep, does not pay the strictest attention in selecting the animals from which he means to breed? Would Bakewell ever have attained his deservedly great name, but for a rigid adherence to this, as a leading principle of his professional career? And, if of such vast importance in animal, why not equally so in vegetable life? Many of the Lancashire farmers, to my knowledge, are in the practice of whipping their seed wheat; that is, of beating out the head of the grain against a board, set up slantwise for the purpose; by which means the plumpest and ripest grains only find their way into the seed basket, or drill. A farmer of considerable extent in West Norfolk, has carried out still further this idea, by gleaning from his main crop all the finest and forwardest ears in his different fields of barley; a regular constant recurrence to which practice cannot but be productive of solid advantages in the run of years.

Whilst on this subject, I feel that I have not sufficiently enforced the importance of paying very particular attention to the perfect *maturity* of either corn or seeds intended for sowing. Maltsters are well aware of the necessity of this, in the case of barley—unripe grain never vegetates freely, and, of course, can never make good malt. Cobbett's Indian corn did not succeed in this country, because, *after the first year*, the seed did not properly ripen. Had he continued to use seed of foreign, instead of

English growth, the result might have been different. Take the case of lucern again—who would ever use home seed that could procure foreign? I am inclined to think the same of Bokhara, and indeed of every other kind of clover. Rely upon it, they ought, one and all, to be thoroughly ripe before cutting; and we know that there are seasons when this cannot be, in our moist, fickle climate.

What says one of our best authorities on this subject, Dr. Lindley?

“In all cases where any importance is attached to the result, the plumpest and heaviest seeds should be selected, if the greatest vigour is required in the seedling; and feeble, or less perfectly formed seeds, when it is desirable to check natural luxuriance. It is apparently for this reason that old melon seed is preferred to new; for the latter would give birth to plants too luxuriant for the small space in which the melon can be cultivated under the artificial circumstances required in this country.—*Theory of Horticulture*, p. 80.

Again—“Weak seeds produce weak plants, and, therefore, recourse should be had, in all delicate cases, to artificial means for giving artificial vigour to the seed.”—“It is a constant rule that seedlings take after their parents: an unhealthy mother producing a diseased offspring, and a vigorous parent yielding a healthy progeny, in all their minute gradations and modifications; and this is so true that, as florists very well know, semi-double ranunculi, anemones, and similar flowers, will rarely yield double varieties, while the seed of the latter as unfrequently give birth to semi-double degenerations. Independently of these things, it is indispensable that the seed of a plant, when saved, *should be perfectly ripe*, if it is intended to be laid by for future sowing. The effect of ripening is to load the seed with carbon in the form of starch, or some such substance, and to deprive it of water, conditions necessary for its preservation; but if a seed is gathered before being ripe, these conditions are not secured; and in proportion to the deficiency of carbon, and superabundance of water, is the seed liable to perish.”—*Ibid*, p. 181.

One extract more and I have done with this part of my subject.

“The reason why it is so important that seeds which have to be long kept should be thoroughly dried is, partly because seeds have the power of decomposing water, which causes the commencement of germination; and if this happens while they are cut off from the other means of existence, the process of growth must be stopped, and their death will follow; and, in part, from the tendency of vegetable matter in contact with water, to putrefy, if the actions of life are not in play.”—*Ibid*, p. 183.

This portion of my subject dispatched, I come now to—

2. *The Preparation of the Land*, to which I may add, *the best Time for Sowing Small Seeds.*

There can be no doubt but that in this case, as in that of turnips, the finer the surface, the better the chance of the vegetation of the seed. I see no reason to depart from the plan in pretty general use in the best agricultural districts, of sowing the small seeds at, or about, the time of drilling in the crop of barley or oats. I prefer, where only one harrowing is necessary after the drill, to cover both barley and clover at one operation, though I am aware that by some, this is considered too *deep* an earth for the small seeds; but this must greatly depend on the state of the land. If coarse enough to require light rolling after the harrows, the clover had probably better be sown *after* these, and *before* the roller. If deferred till *after* the roller, much of the seed will perish, especially should the season prove dry: for though clovers and such other small seeds require very little covering, still they do require *some*. After the seeds are once sown, and the field neatly rolled, care should be taken, by gathering the stones, and removing all other obstructions, to render the surface as level as possible. The benefit of this will be apparent at mowing time, otherwise in the event of a short crop much loss and waste will ensue. One word as to the sort of harrows suitable for following a drill, or burying small seeds. Not one farmer in ten makes use of harrows light enough. *Speed*, rather than *weight*, is wanted at this work; and a tine about 3 inches long, and in the stoutest part not bigger than your little finger, will be far better than larger and longer. I cannot bear to see over-weighted harrows. It does harm, instead of good. It is, of all labour on a farm, the heaviest for a horse, and we ought not needlessly to increase it.

3. *Attention to Cleanliness during Growth.*—Some will smile at the idea of hoeing or weeding a clover lay, as a waste both of time and money. To this one can only reply, let those laugh that win. If, as I firmly believe, cleanliness of tilth is essential to *any* crop, it surely cannot fail to be so in the case of clover. Let us only reflect for one moment. Whatever weeds or rubbish there may be in the clover, will be ploughed in, and rise up again amongst the wheat crop, for which we will suppose the clover to be a preparation. Docks, for instance, and other perennial weeds, which are annoying enough in clover, but even more so in a wheat crop; and they are more likely to increase in the latter case, because if broken by the plough or harrow, every little piece is sure to strike root, and in time to form a distinct plant. Weeds of all sorts are held in abhorrence by every farmer who prides himself on the superior cultivation of his land, but docks perhaps more than any

thing else of the kind ; whether from their exhausting properties, or from their extreme tenacity of life, I hardly know, but so it is. Even the sloven who suffers his thistle-down to whiten his own and his neighbour's fields, would feel something akin to shame, if reproached with suffering his land to be overrun with docks. By the bye, speaking of thistles, it may be as well to notice an excellent regulation which exists in France to prevent the spread of this noxious weed. Neglect of weeding, or other checks to their growth in the fields and hedges, is punishable by action at law ; and though I confess I am not Quixotic enough to imagine that men may be made good farmers, any more than good christians, by act of parliament, yet I see no violent objection if thereby a public nuisance can be abated, to its introduction into this country. I think I know certain spots where such an enactment would be eminently beneficial, and where fear may accomplish what shame has failed to do.

It is unnecessary here to enumerate all the weeds to be found in but too many of our clover layers ; but there are one or two others I cannot help adverting to, because they are not only very unsightly in a sample, but detract materially from its value in the eyes of all good farmers. I mean plantain, darnel, and stone-grass. May-weed or the common wild camomile is also a very ugly, and, I might add, disgraceful weed in layers. This, and indeed the chief of those above named, can only be extirpated *in the field* ; for it is obvious if they approach in size or weight to the seed when thrashed and cleaned, it is utterly hopeless by any known mode of dressing, wholly to get rid of them. In short, the matter rests with the farmer and not with the seedsman. If I am asked how, and when I would set about this field-work, my answer is with a very narrow hoe, such as is used for cleaning dibbled wheat, and as early in spring as the season will allow ; for it is a fact well known to all observers of such matters, that many of the worst weeds show themselves very distinctly long before the clover forms its crown—a circumstance highly favourable to their extirpation by the hoe.

My late intelligent and lamented friend, Ben. Holdich, in his valuable " Essay on the Weeds of Agriculture," has the following sensible remarks on weeding in general. What is the inference from the facts, that some kinds of weeds can by no means be extirpated ? Is it not perpetual exertions, fallowing, and agricultural labour ? Some may be inclined to say—a melancholy reflection ! But I say *no*—not at all. Providence could not have better contrived than that exertions should be perpetual, and that *success* should be in proportion. There is not a weed that we ought to wish out of our fields, unless we remove and destroy it ; because, if there were none, or very few, all fields would be clean, and

no praise could light on superior modes of tillage. Some may say again—so much the better! But I say *no*. Does any man think that our various soils would have been sufficiently pulverized and worked, had there been no enemies of this sort to challenge forth our labour? Sterility would have seized on our turnip lands, which are only continued in a state to bear their rotations of crops, by the necessary periodical renewals of their fertility. So might all our clays have gone to perpetual grass; for neglect of proper tillage would have rendered them unprofitable. ‘By the sweat of thy brow thou shalt eat bread’ is an ordination of the highest authority, and the fulfilment of it is that precise principle which puts all mankind in motion. The necessity of subsistence produces industrious hands for every department of labour; but the sluggish nature of man requires every stimulus to exertion. The weeds of the fields excite emulation among farmers; and foul fields are always a reproach to the occupier. Thus we are compelled by an unseen hand to better habits and more active industry.”—Pp. 33, 34.

Again—“It is true that certain soils are more obnoxious to particular kinds of weeds than to others, and *vice versa*; also that the same proportion of labour, skill, and attention, which, when employed, shall keep clean and in good heart one kind of soil, shall not be found adequate to produce the same effects of clean and perfect husbandry, on another soil differently constituted, but that increased precaution and industry are required to produce the same effects.

“Precaution here is of great importance; for, if the seed-corn be not clean, the crop will be foul, whatever care may have been employed on the land: on the other hand, should the land itself be clean, and the seed-corn likewise, yet, if the hedge-rows are neglected, and suffered to harbour these weeds, the evil will be found only lessened in a degree, not removed.

“To extirpate these weeds, therefore, *clean seed must be used*; not a single plant of these weeds suffered to perfect seed in the hedge-rows; and a judicious rotation of crops adopted, so as to admit of the unsparing use of the horse and hand-hoe; by which means, these noxious and disgraceful pests will be overcome, and banished from the soil.”—P. 48.

Mr. Holdich has hit the nail on the head. Vain are all the efforts of the farmer to produce clean crops, if his hedge-rows are suffered to be made the nurseries of all kinds of rubbish; and there is no surer test of tidiness than the presence of neat, compact, well-ordered fences. I am well aware that it is too much the custom with certain farmers to cover their negligence and ignorance on this point, with the excuse (repeated

so often that they themselves believe it true) that their *land is given* to this, that, and t'other description of weed. Given indeed! If they had said the weeds were *given to the land*, there would be more sense in the remark. Where land is *given*, as they say, to certain weeds, poppy for example, it will always be found that, in place of checks, every encouragement is given to the propagation of the nuisance. Nay, I have been told myself, and that in sober earnest, that it is hopeless to attempt to get rid of red-weed (poppies), because, forsooth, the more you pull, the more you will have! Now, if any one will take the trouble to reckon up, though in ever so imperfect a manner, the number of seeds, each these plants is capable of producing, and which, observe, on the let-alone principle, are all ploughed in, either with or without a crop, with the certainty of their showing themselves the very first opportunity, he will soon see the necessity of "stopping the supplies," as the only effectual method of remedying the evil, and of proving the folly of relying on that lamest of all excuses for slovenliness—"the land is given to it!"

I come now to the fourth and last division of my subject—

Dressing and Cleaning of Clovers and other Small Seeds for Market.

And first, a few words on thrashing, or *drawing*, as it is usually termed in this district; viz., extracting the seed, whether of clover or trefoil, from the *cob*, or husk. The old, and perhaps still the most common way, is by the flail, on the bare barn floor; a method open to two objections—the partial destruction of both seed and floor. Nor is this all; water is not unfrequently applied to facilitate the operation of starting the seed. The immediate effect of this is to deaden the brightness of the sample, and, of course, to detract materially from its value. So much for *hand-drawing*. The thrashing machine is next pressed into the service, and would be an improvement on the flail, but that, unfortunately, in nine cases out of ten, the seed is even worse used than by that method. It is not only *bruised*, but *broken*, and often so split by the rubbing it receives against the inside of the cove, or cylinder, by which the beaters are inclosed; as, with all the care possible in dressing, it is next to impossible to prevent its appearance in the bulk of the crop; and of that which *appears* whole much is inwardly bruised, and otherwise so injured, as completely to prevent the seed from germinating. Very powerful and effective steam engines are, however, coming into use for this purpose, and, when well constructed and under suitable management, are by far the best and safest methods resorted to, both for drawing and dressing small seeds. I have seen, for instance, trefoil, the seed of which, by a peculiar operation, has been nipped, or squeezed out of the

kosh, or husk, in so neat, and yet so safe a manner, as to be comparatively uninjured; and yet the refuse kosh is, to all appearance, whole and untouched. Whereas, but in too many instances, it is reduced by the violent action of the thrashing machine to a partial powder: a result by no means unimportant, when it is considered that this substance, when comparatively unbroken, is a very useful article of food for sheep and lean stock.

After the operation of thrashing, but little remains. The best dressing machines, unquestionably, are those which are best calculated for the separation of the prime seed from the seconds and offal. The old-fashioned plan of casting, or throwing the seed in the rough, from side to side of a large barn, or other dressing place, is still partially resorted to; but I cannot help thinking, that the great and increasing improvements which have been made, and are still making, in the various branches of agricultural mechanism, will eventually supersede these and all similar devices of a like clumsy and antiquated description; though I am aware there are not wanting those who, with old Mause Headrigg, would inveigh bitterly against the practice of many who "canna content themsels wi' the blessed winds o' heaven, but must mak' use o' thae new-fangled machines for dightin' out the corn."

WHITTINGTON, Stoke Ferry, Norfolk,
March 11, 1843.

American Receipt for Curing Hams.—The following is a receipt for curing hams, which I tried last fall, and found superior to several other modes I had before tried, the hams and shoulders being far sweeter and better flavoured, and preserving well through the summer:—

Dissolve two ounces of saltpetre and two teaspoons-full of saleratus in strong brine, for every sixteen pounds of meat; boil and skim the above thoroughly, and add molasses in proportion to one gallon for each hogshead of brine. Let the meat remain in this pickle three or four weeks, then smoke with hock downward.

Packing hams in oats in such a manner as not to allow two to come in contact, preserves them in a much better condition than any other mode I have seen practised.—Yours, &c., C. STARR, Jun.—*American Agriculturist.*

FARINA—POTATO FLOUR—FROM IRELAND.

SIR,

I am surprised to find such large parcels of farina, a flour made from potatoes in Ireland, imported into Liverpool, the price of which is 12s. 6d. per cwt., being nearly 10^{lb}. for a shilling. Many families use one-third of it with wheat flour. On enquiry, I learn there is a large factory at Strangford for the manufacture of it; that 10,000 tons per annum of potatoes are made into flour, chiefly used in and near Manchester, a large portion of which is consumed by the weavers and calico printers, who formerly used American flour for their warps and piece-goods. It will now become an object for the English farmer, to look out for cheap land in Ireland, to grow potatoes and wheat. As far as I can see, it will be very profitable with land at 3d. to 1s. per acre for ninety-nine years; (*see Mr. and Mrs. S. C. Hall's Work on Ireland*, vol. iii, page 363); and I recommend the following statements for the consideration of the Lincolnshire farmer and all those who hold high-rented estates, viz.—

10,000 tons potatoes, if made into flour farina, will	}	£31,250
lose 75 per cent moisture, leaving 2500 tons of		
flour, at 12s. 6d. $\frac{7}{8}$ cwt. or £12 10s. $\frac{7}{8}$ ton . . .	}	£10,000
200 acres (Irish), produce 80 tons potatoes $\frac{7}{8}$ acre,		
call it only 50 tons $\frac{7}{8}$ acre, or 10,000 tons, value		
20s. $\frac{7}{8}$ ton		
Leaving a profit for 200 acres of		£21,250

from which is to be deducted rental 10s. per acre, which is far above the average rental, as the work above referred to will show; the utensils and labour requisite for crushing the potatoes must be small.

I should be glad to see in your valuable Magazine some information on this subject, as I think the Irish farmers must be getting rich, else they would not be so quiet whilst the English farmers are making much loud complaint.

ISAAC SHIMVILLE.

ST. MARY'S GATE, Manchester,
11th March, 1843.

NATURAL SILICATE OF POTASH FOR MANURE, IN FELSPAR AND GRANITE.

SIR,

If you have not already given insertion in your Magazine to any correspondence or article on using granite as manure, perhaps the following letter possesses sufficient novelty and interest to secure it a favourable reception. It is the production of Mr. J. Prideaux, and I extract it from the New Farmers' Journal.

Numerous as the sources whence manure can be drawn have hitherto been considered, the recent discoveries of science prove that we are not to believe it a matter of impossibility to extend them; and it is to the enterprising researches of our chemists that the merit is due. By some it has been asserted that chemistry would effect every thing in agriculture; others think it would not confer the slightest advantages; but, surely, it were wiser to hold a medium course, seeing what that science has revealed, for it would be worse than absurdity at the present time to attempt to sneer it down, or to deny palpable facts, which are spreading widely and daily disarming long and deeply-rooted prejudices. The extent of its discoveries are not to be easily estimated; and, since the "eternal" granite, as it is often termed, can be converted into manure, we may cease to be astonished, and look forward, as a matter of course, to the subjugation of other seeming impossibilities. But to the letter:—

"On a future occasion I may have something to say about the nitrogen; but my present object refers to potash, which being drawn from the soil by every crop, requires constant renewal. Wood-ashes are not produced in this country in sufficient quantity; burnt weeds and leaves, and the farm-yard straw, return only a part of what was drawn from the soil; the potash, in the food both of man and beast, coming off chiefly in the liquid excrement, and running to waste not only in town sewerage, but too often in farm-yard drainings. Liebig's artificial silicate of potash, referred to by Mr. Trimmer, for agricultural purposes, may be more likely realised in the woody districts of Germany, than in our coal-burning country, where the potash itself seems to be wanting.

"There is, however, in our vicinity an inexhaustible store of this alkali, though not hitherto thought of as a manure, nor in its present hard and durable state fit for the purpose. If slate and dunstone contain potash enough to fertilize their soil, felspar comprises it in much larger proportion, about 17 per cent of its weight; and felspar is the basis of Dartmoor granite. This granite may contain about 10 per cent potash

(varying, of course, with the proportion of felspar), in too hard and compact a state to yield to the weather fast enough for the purposes of manure. But this hardness is not difficult to reduce. By turning it, whilst red-hot, into water, it is rendered quite brittle and crumbly; and being then mixed with fresh lime and water, is made much more susceptible of decomposition, and easily yields part, at least, of its potash. The surface granite, already softened by the weather, will not do, having already lost a part of its alkali. China clay, apparently decomposed granite, is almost entirely destitute of potash; and the soils formed upon granite are unproductive, probably from the same cause.

“The chippings and fragments of the solid stone, accumulating at the granite quarries, may be heated with turf in the common lime-kilns, and raked down into water as fast as they get red-hot; in which manner many tons per day may be done in one kiln. Thus rendered brittle, it may be rapidly crumbled by a water-power crushing-mill. And as turf and water-power are both plenty about the granite, this rough powder might be sold to the farmer at a lower price than lime.

“A ton of this powdered granite mixed with a ton of fresh lime, being heaped on a thick bed of earth, and closed in all round with earth, leaving the top open; water is to be poured on gradually, enough to slake the lime entirely, and then all covered in; the bed of earth at the bottom being one or two feet thick, and round the sides eight or nine inches; making good the cracks produced by the swelling of the lime when slaking. After two or three days it may be uncovered; the granite and slaked lime well mixed up with water to a soft mortar, and again all covered in close with earth. In this state it may be left two or three months at least, and better if longer; keeping it wet and soft. When wanted to use, the whole heap should be well mixed together, including the earth, which will be impregnated with solution of potash. It is then fit for spreading.

“Two hundred weight of granite will contain as much potash as a good acre of wheat (say thirty bushels), including the straw. Hence a ton, prepared as above, might do (reckoning the time required for decomposition, and the other manures employed) for two or three acres of light soil, once in four or five years. Loamy and dunstone soils are not likely to want potash so often. But in an article yet untried, we cannot recommend proportions with much confidence. Experiments, at first in a small way, with different proportions on different parts of a field exhausted of potash, but not of humus, and not over-limed, giving the whole about 1 cwt. of bone-dust per acre, or a ton of night-soil, that the crop might not fail for want of phosphates—would furnish

some indications for future guidance. Its durability must be determined in the same way; of course the faster it is decomposed, the greater will be its early effects, and the less its permanency.

"The object is to convert the hard crystalline aluminosilicate of potash into a crumbly calcareo-silicate of potash, much more susceptible to moisture and to the weather. Thus prepared it yields its potash very slowly; and if required more active, it may be melted in a reverberatory, with 10 per cent of salt; but this would add so much to the cost as to pay only where granite or felspar requires long carriage, and where fuel is cheap. In general it would be better economy to make up the activity by quantity, and thus get durability at the same time.

"Basalt, or any other rock rich in potash, will answer the purpose, where granite or felspar is too distant for carriage.

"J. PRIDEAUX."

The negligent and unjustifiable waste of manure has often been censured in your pages; and granite unknown and, consequently, unappreciated, has hitherto been neglected. The chippings at quarries, and about buildings in the course of erection, docks, piers, &c., however, have acquired a value in the eyes of the agriculturist, and it is doubtful if they will now be allowed to cumber the ground uselessly. I must say that the discoveries of science will be lightly estimated if it should prove otherwise; but I cannot, by any means, entertain such a contemptible opinion of the agricultural class, for they, like others, look sharply enough after their own interests.

BETA.

March 1, 1843.

American Pigs.—At the Fifteenth Annual Fair of the American Institute, held in New York in October last, the "American Agriculturist" draws the following contrast. "The swine were fairly represented in the Berkshires, Chinas, and their crosses. There were some beautiful specimens of these, and if any one doubts that it is the corn-crib alone that makes the pork, let him scan closely the fine forms, thin hair, mellow elastic handling, the delicate limbs, and quiet countenance, expressive of peace with all the world, exhibited by some of the grunTERS inside the yard, and their Hammish kindred without, a roaming, restless, thriftless brute, with legs reaching to the back-bone, the bristles of a porcupine, the hide of a rhinoceros, the snout of a ploughshare, and all the grim aspect and unthrifty look of a wolf or hyena; thrice cursing the human race—a curse to their neighbours, a curse to their feeders, and a curse to their eaters!"

THE PROPOSED MONUMENT IN NORFOLK TO
LORD LEICESTER.

It is well known that a subscription for the above purpose has been set on foot by the Yeomanry of Norfolk, which (to their honour be it spoken) has been cheerfully and liberally supported without distinction of rank or party, by all who knew how to appreciate the many and exalted virtues of our departed friend. My present object, however, is not so much to eulogize the dead, as to offer a few remarks, which I respectfully submit to the consideration of the farmers, not of Norfolk alone, for they need no such incentive to duty, but of England, nay, of the world at large; for to no country, no quarter of the globe, were his exertions, his magnificent hospitality confined. If, then, so extensive has been the range of his influence, so great the number of those who have participated in the benefit of his example, surely in common gratitude, the least that they can do, is, to join in rearing this tribute to his memory. I am the more anxious to apply for this purpose to farming friends in distant counties, because it may be imagined, that, as the design originated in Norfolk, the subscription ought to be confined to Norfolk.

I regard this, *not as a mere local matter*, but as one which concerns every farmer in Great Britain. I can only say in conclusion, that I shall be happy to be the medium of transmitting any sums (they can easily be sent through the post-office) that may be forwarded to me, to my friend Mr. Robert Lemon, of Whitwell, near Rupham, the chairman of the Leicester Monument Committee.

SAMUEL TAYLOR.

WHITTINGTON, near Stoke Ferry, Norfolk,
March 14, 1843.

P.S.—In offering to receive subscriptions, I hardly need add, that I can have no other motive than to facilitate their transmission to the proper quarter; for I have frequently observed on occasions like this, that inconvenience, and even loss, have arisen from ignorance on the part of many at a distance, of the medium by which their payments should be made. It may not, therefore, be amiss to say, that a post-office order, addressed to the chairman (Mr. Lemon), or to any of our local banks, on the "Leicester Monument account," will be equally safe, and convenient, as by any other means.

I have only to add, that the subscription list will be closed in June, and, consequently, that time does not admit of more than this hasty, and somewhat abrupt notice of the subject in your Magazine.

IRELAND CONSIDERED AS A COUNTRY FOR THE PROFITABLE INVESTMENT OF CAPITAL,

In an Agricultural and Manufacturing Point of View.

By Ma. ROBERT BELL, late of Morpeth, Northumberland.

SIR,

There is, probably, no country in the world that offers to the capitalist at the present time so extensive a field to agricultural or manufacturing pursuits as Ireland; which will readily be admitted, if we take into consideration the immense tracts of land available to cultivation, which the power of human industry and skill, if properly directed, could easily render profitably productive; offering such an investment for capital, as we may seek for in vain in any other part of the globe. The great drawbacks to land improvement in America and other distant parts, where our capitalists hitherto have chiefly directed their attention, is the high price of labour, and the difficulty experienced in clearing away the forests and roots of trees, which, in every direction, obstruct the progress of the plough; and, consequently, it may be conceived how *tardy* the operations of the husbandman must be, and *how slow* the return for his expenditure of time and capital in emigrating to America; besides the unbounded extent of sea to be traversed between the English and American shores, and the long and tiresome journey to be encountered to the interior of the country after the shore is reached. With regard to Ireland, no such disadvantages exist. Here an Englishman may consider himself at home; being 12 hours sail only from Liverpool to Dublin, and a rapid communication from thence to all parts of the country, with a daily and safe transit for goods and cattle, by well-regulated steamships. In Ireland labour is so cheap and *abundant that hundreds* of able-bodied workmen may be had at 8d. a day, and thousands of acres are to be met with, at present almost in a state of barrenness, which the proprietors would be glad to be let on leases, in many cases for 99 years, renewable for ever, at rates so low as 6d., 9d., and 1s. per acre; and this for land only requiring, in most instances, a perfect system of draining, to fit it for the working of the plough, or application of the spade; after which, with a due proportion of lime, which is abundant throughout the country, or other correctives to the partially decomposed vegetable matter of which those wastes are mostly composed, the land is rendered permanently fertile, and capable of bearing crops not generally exceeded by the best natural soil, which previously only

afforded to store cattle a scanty herbage during a few months in summer.

To the manufacturer it would be rare to find in any country greater facilities for an extensive range of business than Ireland in many parts affords. Look at her inland navigation, and her many noble navigable rivers, on which the sound of the water-wheel is never heard, and the cheerful hum of machinery undreamt of by the inhabitants. Should the stranger look along her coasts, he will wonder why the beautiful bays and safe anchorage harbours are devoid of shipping, and other busy scenes on shore.

To what is this attributable but to a want of a spirit of enterprise of the Irish generally, and to the capital of the country being directed into other channels, but little of which is made available for the country's good. Should the English manufacturing capitalist ever turn his attention to Ireland, where labour is so cheap, and communication with other countries so available, it would be well for him to consider how his occupation on a large scale, in connection with an extensive system of agriculture, would work together; as, at certain seasons, when the hands required at the mills were idle, the force could be turned to good account on the busy out-door operations of the farm, and vice versa, and the number of people thus employed would form a home market for much, if not all, of the produce of the farm.

The advantages of Ireland, for investments of capital for agricultural or manufacturing pursuits, cannot but be much deteriorated in the estimation of those who have capital to embark, on reading in the public prints alarming accounts of barbarous murders committed in the open day, and of midnight marauders, with which the country is overrun, rendering life and property unsafe. Now these accounts are invariably much exaggerated, and wielded politically by the liberal or tory papers for party purposes, as the case may be, and seized upon by the party in England, and sent blazing forth, with suitable additions, to the English public, who hold up their hands, and ejaculate—"Bless me! what barbarous people those Irish are."

It would be useless to deny that heinous crimes have been committed in parts of Ireland, and those, too, of recent date; but trace the origin of those crimes to their proper source, and you will then see the primary cause. Need I say its first instigation is oppression, and whenever this black malignity exists, in proportion will crime be found to prevail. In the county of Tipperary and confines of the counties that surround it, crime hitherto has been mostly prevalent. Here the soil is fertile to an extraordinary degree; bearing crops with scarcely any trouble of culti-

vation, and much of it without the aid of manure. This district is mostly in the hands of middlemen, who extort exorbitant rents from the numerous small holders amongst which it is divided; often beyond their means to pay in the best seasons; but, competition for such land being so great, almost any price per acre is consented to. The result is—the poor and over-burthened tenant cannot meet the landlord's demands; for the vicissitudes of seasons and various other causes may go against him, and, after all his unwearied toil and mental anxiety, he becomes a broken man; his goods and chattels are distrained and sold; his little holding is let to another, and he, with his companions in sorrow, his wife and children, are turned upon the wide world in poverty and distress. This creates a spirit of revenge, which is fostered in his bosom; which, if not frustrated by an averting power, or otherwise, is put in execution on his supposed wronger, and he finds no lack of assistants of a kindred feeling, to assist him in the perpetration of the unpardonable act. But it is not in this notorious district I would seek to lead the capitalist to look for suitable investments, but would direct his attention to the counties of Kerry, Cork, and part of Limerick, where such a thing as a murder or highway robbery is not known to have been committed for the last 30 years; and any one in England, turning his thoughts to agriculture or manufactures in this country, by paying me a visit in the vicinity of the parts mentioned, I will be happy to afford him all the information which a two year's residence enables me to give. Mr. Bryan, in his "*Practical View of Ireland*," in speaking of the district in question, observes—

"A circle of twenty miles diameter, having Abbeyfeal for its centre, forms a portion of the great group of hills between the Shannon and the Blackwater, which are situated on the confines of the counties of Cork, Limerick, and Kerry, which group occupies 640 square miles Irish, and are all nearly of the same character.

"Abbeyfeal, in the centre of this tract, is a village in the county of Limerick, on the east bank of the river Feal. It has 440 inhabitants. This village being 6 miles north of the junction of three counties, the circle would extend 4 miles southward into Cork; and, being close to the boundary of Kerry, extends 10 miles westward into that county, and 10 miles eastward into Limerick. Near its circumference are situated the towns of Castleisland, Newcastle, Shanagolden, Elyn, Tarbert, and Listowel. This last is 8 miles distant; the others from 10 to 12; and there is no resident gentlemen, except a few in the immediate vicinity of the towns above mentioned, and below the basis of the hills.

“The mineral productions, so far as they have been discovered, do not excite much interest. The hills are of the ‘coal formation,’ highly indurated sandstone, and black slate-clay, of various degrees of hardness. On the rocks several beds of culm have been discovered, and some of them worked; but those already wrought seldom exceed 12 inches in thickness, and dip at a steep angle. These circumstances, together with the unskilful mode of working, render the expense of raising the culm considerable, and the demand is not great, on account of an abundant supply of turf in all parts. Limestone is the rock on which all those hills rest; and it is found all round them at the base of the group, and in many places towards the south in the interior.

“The outline of the hills within the circle is tame and uninteresting. The rock is covered with a coat of clay, from 3 to 30 feet in thickness, formed of the course of the decomposed debris of the rocks, which lie beneath, and contain the two ingredients—argil and silex, with scarcely any mixture of lime. Towards the summits of the hills, and even a good way down their sides, the clay is covered with peat or bogs, generally from 6 inches to 3 feet in thickness; which produces heath and a few species of coarse grass. Further down, approaching the valleys, there is no bog, but a vegetable soil; part of which is tilled, and produces good crops of oats and potatoes. Where lime has been applied the produce is three or four-fold, and in some instances ten times the quantity has been obtained.

“More than three-fourths of this tract have never been cultivated, and the whole affords great natural advantages to the improver, whether his object is agriculture or manufacture.

“The average height of these hills being about 1000 feet above the level of the sea, they are not too high for luxuriant vegetation. The bog, however, which forms the surface at present, if left alone and unmixed with any other substance, is nearly barren; the clay which lies beneath is entirely so; but if the light bog were drained and dug up, and some of the clay substratum got up and mixed with it, along with a proper proportion of lime, a very superior vegetable soil may be made on every perch of the whole surface, and acres of barren heath may be made to produce the finest oats, potatoes, or hay; so the agriculturist having the substratum to form a basis for his soil, and the peat for vegetable manure, on the spot, wants only to bring lime to decompose that manure, and to employ labour in order to convert the wild haunts of the grouse into a productive field for human sustenance.

“A circle of 20 miles diameter is 201,062 Irish acres. It is allowed that a well-cultivated acre will support five persons; in the present in-

stance admit it will support them; and if three-fourths of the above quantity be in the state of nature, the land now waste, could, by industry, be made capable of maintaining 453,390 persons, or nearly half a million. Here might the labour of emigrants be well directed at home, which is now in active operation clearing the wastes of America, if advantage were taken of resources which our own country possesses.

"The manufacturers will here find advantages not less interesting; a constant supply of water in the Feale, the Smerla, the Ullahan, the Clyda, the Brina, and several other rivers, with from 40 to 50 feet of fall upon an average in every mile of their length, offer a boundless field for their operations.

"The area of a circle 20 miles in diameter is 314 square miles; and allowing 36 inches deep of rain-water to fall on the whole surface in a year, which is under the average for the last 3 years at Newcastle, there fall 1,186,920,000 tuns; divide this into 20 parts, and allow 15 of these parts to go off in evaporation, 3 parts to be lost by a redundancy in floods, and 1 part to go to waste about the dams and rivers made to conduct it to machinery, there still remains 1-20th which might be used. This is 59,346,000 tuns of water, which could be made to act upon a number of falls, amounting in the aggregate to 100 feet perpendicular, at least.

"Again, allow the effect produced only equal to one-third of the power employed, and we have nearly twenty millions of tuns for the effective quantity, and this in operation on 100 feet fall is equal to 11,428 steam-engines of 25 horse-power each. Mr. Webster in his lectures at the Dublin Institution in 1819 said that there were then 12,000 steam-engines in Great Britain; therefore we have in our circle of 20 miles diameter, nearly as much water power available for mechanical purposes as all the steam-engines in Great Britain at that period were capable of producing.

"Hitherto the want of passable roads was one insuperable bar to the improvement of this neglected district. The new roads lately made at the expense of Government, of which there are 35 miles within the circle, are the first steps towards a very desirable change which, indeed, they have already produced, both in the comfort and morals of the population, as well as creating habits of industry not existing before, to an extent truly surprising."

ROBERT BELL.

GUNSBORO', near Listowel, county of Kerry,
22nd February, 1843.

ON THE CELEBRATED PERUVIAN MANURE CALLED "GUANO,"

ITS PERMANENT FERTILIZING QUALITIES AND GENERAL "RESULTS,"
FROM ACTUAL EXPERIMENTS IN DIFFERENT PARTS OF
GREAT BRITAIN AND IRELAND.

In carrying out further general information for the practical farmer, I cannot do better than commence with the sanction of the highest authority in the commerce of our country, by extracting the actual sales of this new manure guano from the Liverpool Brokers' Circular :—

"Guano has now become an article of standard value and of current sale—large parcels having been taken by dealers and agriculturists at from £10 to £12 per ton, according to quality, and not less than 2000 tons have lately been sold at these prices. The sales this last week (27th January) are 250 tons at above rates." Since then, up to the 17th of March, they have been—

	<i>Tons.</i>
3rd February.....	200
10th ,, ...	150
17th ,, ...	150
24th ,, ...	220
3d March 	250
10th ,, ...	500
17th ,, ...	400

From the Liverpool Mercury.

We consider it a duty to call the attention of our readers, especially those engaged in agricultural pursuits, to any discoveries that may be made from time to time, which will enable the farmer to produce larger crops at less cost than he has hitherto done. Science is rapidly unfolding from her mysterious stores new facts which bear a very intimate connexion with many of the most important arts of life. Husbandry, more particularly, has of late derived from chemical and geological science much valuable assistance, recent discoveries having proved the vast importance of a proper and systematic plan of manuring, adapted to the peculiar quality of the soil. In pursuance, then, of the desire we always cherish, of urging upon the notice of the British farmer any new lights that may break forth affecting his profession, we now continue our in-

formation, respecting the new manure guano, which they will do well to read and ponder on. Guano, it is scarcely necessary to say, is a natural manure, imported from the coast of Peru, and which is at once, and without any preparation, ready for the farmer's use. We find that already very extensive sales of this article have been made, that it is rapidly making its way into the over-worked worn-out soils of England, and that the results, where it has been judiciously managed and compounded with the land, are really magical. It is not more than eighteen months since this subject was brought before the public, when Lord Stanley, for the first time, named it at the dinner-meeting of the Royal Agricultural Society, in Liverpool, July, 1841. The French Board of Agriculture and Science seem to have directed their attention to the value of guano, and their report, which was made by order of the French government, is given at length in the last number of the *British Farmer's Magazine*, p. 604. That guano is the cheapest and best manure, judging from the evidence before us, there can be little doubt; it appears not only to cost less per acre, but to save the farmer great expense in labour and time (which is money); it likewise yields him far greater crops than he can obtain on any other plan, and the *certainty* of the return is likewise greater. Another advantage is, that he is enabled to bring his produce earlier to market, thus availing himself of the higher prices which are generally to be obtained at the commencement of the harvest.

Captain Barclay, of Ury, in Scotland, whose tour in America is just published, has somewhat startled us by expressing the opinion that at no distant period there will be a general falling off in the corn crops of that country. This opinion is the result of a personal and practical inspection of some of the best farms there, and the cause of the deterioration now going on is the existing system adopted there of constantly corn-cropping the land; natural barrenness taking place from the gross mismanagement of the farmers, who have no regular course of crops or enlightened system of husbandry. This being the case, it is the more incumbent on us to improve our own soil to the utmost extent, for, as (in our present artificial state) we are periodically compelled to undergo "famine prices," we should do all in our power to preserve, by the means providence places within our reach, the bounties of nature in the kindly fruits of the earth. To improve our own resources will, in its effect, be a step in the same direction as free trade.

Deeply impressed with the importance of all scientific researches, and more especially of those which can be made immediately subservient to the practical concerns of life, we are gratified to observe that

the directors of the Liverpool Collegiate Institution intend to establish, in their noble schools, a class for agricultural science, upwards of 10,000 notices to that effect having been circulated amongst the members of the Royal English Agricultural Society, at their great meeting held in Liverpool. We trust this is an example likely to be followed by other institutions of the same kind, and that it may be the means of introducing very many improvements into our system of husbandry.

Extracted from the Ayr Observer, by the Dumfries and Galloway Courier, of the 6th February, 1843.

We some time since indulged in a few remarks, suggested by a short drive in the vicinity of St. Evox, where we were shown several fields of turnips, portions of which had been manured with guano, either in a pure or mixed state. The crops belonged to Mr. Skinner, of Auchincraive, as we formerly remarked, and were amongst the best, if not the very best, we had anywhere seen this year. Those sown with guano were evidently superior to those grown with farm-yard manure; though both were excellent. Mr. Gairdner went over a field of wheat with us, not far from the mansion house of Auchincraive, upon which he had tried guano and farm-yard manure; the former at $5\frac{1}{2}$ cwt. per acre, which, at the rate of 18s. per cwt., is £5 1s. 6d., including carriage, sifting, and sowing; the latter, including tolls, filling, and spreading, about £6 10s. The braird, however, as we formerly mentioned, was so much destroyed by rabbits, that no one could judge whether the guano or dung had the advantage; except on a few patches here and there, which told greatly in favour of the former. Doubts have been entertained whether guano will tell equally with other manures in the succeeding year's crops; but there is a direct saving in the first place of £1 8s. 6d. (equal to the rent of the land) with the certainty of a better crop; so that, even should guano not prove durable, *though there is no reason to think so*, the farmer would still be a gainer. The saving this year by a reduction in the price would be upwards of £2.

At Highfield the crops of turnips, as a whole, were inferior. The rows where soot had been applied were, comparatively, a failure. This may have been owing to the peculiar drought of the season. Bone-dust had done well, as usual, but not equal to guano: the difference was not perhaps so much observable in the size of the bulb, as in its solidity and compactness of shape. Both Mr. Skinner and Mr. Henry remarked that the guano-manured turnips came away in the greatest luxuriance at first—a circumstance of much advantage in the cultivation of the crop so dependent on its early nourishment as turnips. The less well

supplied with food at the outset of its growth, the bulb rarely attains that healthy condition so essential to its maturity; hence the peculiar adaptation of guano to turnips. But Mr. Henry's experiments were not limited to green cropping. On a portion of a field, which had been previously in turnips, where the bulbs were so indifferent that he caused them to be lifted, in place of being eaten off, he sowed about $1\frac{1}{2}$ cwt. of guano along with the barley: the effect soon became visible in the very superior colour and strength of the braird, compared with the other and more fruitful portion of the field; while the return surpassed his highest expectations.

Without pursuing our own observations farther, we shall take a hurried glance at the contents of a number of letters which have been kindly forwarded to us by our agricultural friends, detailing the results of their guano experiments. We take them up at random.

1. Mr. Jamieson, of Newhouse, Kilburnie, tried 5 cwt. guano mixed with 30 bushels of bone-dust, on about 2 imperial acres; sown with Aberdeen yellow bullock turnips. He also planted half an acre manured with common dung. Those with guano had the start, and in four weeks from the time they braided, appeared as if they had been sown at least two weeks earlier than the other. The produce of the former was about 25 tons per acre; of the latter not much above 15 tons per acre. The soil was a heavy loam; but Mr. Jamieson thinks it would do much better on a light soil.

2. Mr. Russell, Ashwark, Cumnock, tried guano, at the rate of 3 cwt., together with 16 to 18 yards of dung per acre. This was applied to the worst part of the field; yet the crop far exceeded that on the other portion of it, which had been manured with good farm-yard dung at the rate of 60 yards per acre. The guano turnips appeared much fresher, and withstood the effects of the dry season much better. The bulbs in a row left by way of trial without any guano, were deficient at least two-thirds in bulk.

3. Mr. M. Geock, Creus, Wigtownshire, writes that he applied guano in the drills, both on hard and soft land, at the rate of 3 cwt. per Scotch acre. The turnips to which it was applied were about a fortnight sooner¹ ready to hoe than those grown with bones, and about a fortnight earlier than those with dung. The early sown (on the hard land especially) suffered considerably from mildew; though they latterly recovered, and by the end of November looked as fresh as ever. The largest of the Swedish turnips measured 28 inches in circumference. Mr. M. Geock also planted a few potatoes with guano, both on a mossy surface and on a sandy loam, which produced a great increase.

4. From Doonbank Mr. M'Creath writes that he tried guano, at the rate of 4 cwt. per acre, both upon a clay soil and upon good holm land. The crop of turnips, Dale's hybrid, and purple-topped Swedish, was equal to where he applied 20 bushels of bones, and from 20 to 25 cwt. farm-yard manure per acre. The plants appeared rather sickly at first; but, after being singled, they soon assumed a darker and fresher colour.

5. Mr. Henrie, of East Mains, Kilbernie, was most successful in his trial of guano as a manure for turnips. He applied about 5 cwt. in drills to the Scotch acre; and from the first the crop made more rapid progress by a great deal than those that were manured with farm-yard dung. It was at the same time by far the bulkiest.

6. Mr. Kennedy, Myremill, made more than one experiment with guano. He applied in one field 3 cwt., mixed with 15 bushels of ashes to the acre of Swedish turnips. The plants came away freely at first, and the crop proved excellent. Another field of heavier land, for soft turnips, he manured with 18 to 20 cwt. of dung, and $1\frac{1}{2}$ cwt. of guano, sown on the back of the drill. This plan succeeded well. A portion of the guano, however, which he sowed on the top of the dung, did not show any beneficial results.

7. Mr. Tennant, of Greenan, was very successful in his application of guano. He sowed it in drills on land which he considered to have been previously half manured with sea-weed at the rate of 3 cwt. to the acre. The turnips (Swedish), and we use Mr. Tennant's own words, "were the most luxuriant on the farm, and continued so throughout."

8. Mr. Fulton, Jameston, writing on the 15th of June last, says—"It would be worth your while to come this length or send some person to see the effects of this manure (guano). You can see it compared with bones, sulphate and carbonate of ammonia, and rape-dust, on turnips sown the same day. It is so far in advance, with but a very small quantity applied, it seems a most powerful manure for every thing. The guano maintained its superiority throughout the season; and Mr. Fulton's crop of turnips which it produced, greatly exceeded the others both in weight and quality. Some of the bulbs sent to us weighed 15 lbs. Mr. Fulton also top-dressed a field of half-manured potatoes with guano; the crop sown became distinguished amongst the best in the district, and both in quality and quantity gave a most favourable return.

9. W. Nivern, Esq., of Kirkbridge, applied on 3 Scotch acres of land about $4\frac{1}{2}$ cwt. of guano with 72 yards of dung. The crop of turnips was excellent, and equal in quantity to the best he had ever had with 40 square yards of farm-yard manure to the acre.

10. Mr. M'Night, Cumnock, tried a crop of peas, partly with guano and partly dung. The former took the lead: the straw being much stronger, and the quantity of peas about one-third greater. He planted also a patch of potatoes in the usual way with dung, and another about 14 days afterwards with guano, precisely in the same way. The latter braided as early as the former, were more regular and strong, and continued so throughout the whole season; yielding, when lifted, a much greater quantity than the former. The guano was applied at the rate of 4 cwt. per acre.

11. Mr. Jack, overseer to the Lord Justice General, supplies us with several extracts from his farm book, by which it appears that the crop of turnips raised from a mixture of guano and farm-yard manure, at the rate of $2\frac{1}{2}$ cwt. of the former and 16 carts of the latter, was decidedly the best. He had tried guano and ashes, nitrate of soda, bone-dust, &c. From the testimony thus adduced, it must be admitted that the trial of guano last year in Ayrshire, has been as a whole most successful. That it is particularly suitable for turnips seems to be generally allowed, and still more so when mixed with farm-yard manure, or a small quantity of bones. It is, we think, equally answerable for all descriptions of green-cropping and every kind of grain. This is sufficiently exemplified in the experiment made by Mr. Fulton on a field of potatoes at James-ton; and by Mr. Henry on a patch of barley at Highfield. We agree also with Mr. Jack in thinking that guano along with a slight mixture of soil, ashes, or in other words the ashes of weeds, is an excellent manure for moss land. The facility with which it can be conveyed over a soft surface compared with common manures is a great recommendation. The most approved mode of applying guano in turnip culture seems to be in the drill. In potato planting it should be deposited in quantities at the usual distance of placing the seed.

The reduced price at which this valuable manure can now be had will tend greatly to its extended use. Purchasers, however, would do well to guard against imposition, as we have the best authority for stating that adulteration is much practised by dealers.

From Mr. John Taylor, Surgeon, Liverpool, to Mr. W. Danson.

Sir,—Having noticed the progress of guano, from its numerous analytical examinations through all its phases of practical application to agriculture, it has afforded me considerable satisfaction to perceive how well its theoretical character has been sustained by the *results* of experience. In the comparative trials which it has undergone with farm-yard manure, ammonical salts, nitrate of soda, &c., it has proved a concentrated

animal manure of richest fertilizing properties, capable of producing larger crops at less cost, than any other, taking into account its slow solubility in the soil, which gives it permanence beyond its rivals. The discovery of the best means of applying it, so as to render the greatest amount of service, has obviated any objections against its use, and manifested its superiority when appropriately combined with sulphate salts, or decayed vegetable and carbonaceous matters, with due reference to the description of produce expected. The latest analysis of the genuine guano, by Dr. Ure, shows an entire absence of sand and other impurities which have been discovered in large proportion in other specimens, and describes it as a compact mass of the salts of ammonia in combination with soluble phosphates, than which nothing can be conceived more nutritious for the support of vegetation. The genuine guano, therefore, when mixed with an appropriate compost, excels farm-yard manure by the less amount of labour expended in its use: it excels bones, by possessing their nutritive phosphates in conjunction with much urate of ammonia: it excels the various refuse compounds of ammoniacal salts, by possessing the phosphoric salts in addition to abundance of ammonia; and the possession of these salts likewise gives it a preference over nitrate of soda, which, like the ammoniacal salts, merely stimulates the growth of plants at the expense of the phosphates contained in the soil.

I am, Sir, your most obedient servant,

17, NILE-STREET, LIVERPOOL,
January 31, 1843.

JOHN TAYLOR.

From B. Biram, Esq., agent to the Right Honourable Earl Fitzwilliam.

The guano before sent was spread, partly upon grass land, at the rate of three cwt. per acre; soil strong, with a clayey subsoil, and was compared with rape-dust, farm-yard manure, and a portion of land unmanured. The farmer has supplied me with the following particulars:—

Guano, at three cwt. to the acre, produced one ton, thirteen cwt., two quarters of hay.

Rape-dust, at ten cwt. per acre, produced one ton, seven cwt.

Farm-yard manure, at eight loads per acre, produced one ton, ten cwt.

One acre unmanured, produced one ton, one cwt., two quarters.

The grass land upon which it was spread was very visibly greener and had longer grass than the adjoining land, early in the spring.

THE WIRE-WORM, SLUGS, &C., KILLED BY GUANO.

SIR,—I understand you take a great interest in disseminating useful information amongst farmers, and as the new manure guano is now getting

into general use both in Ireland and England, I beg to state that I sold, last year, a considerable quantity for trials, in various quarters of the counties of Down, Armagh, Louth, Monaghan, Cavan, Kilkenny, Roscommon, &c. The results are generally highly favourable. Mr. Wm. Blacker, of Market Hill, used it to a great extent last year, and this season he is covering upwards of 1000 acres, which will take about 100 tons of guano; and at turnip time, from May to July, *ten times* the quantity will be required, as it preserves the crops, besides bringing them to maturity much earlier. There is a fact connected with potatoes this winter which should be generally known, viz., the binns of potatoes in the fields grown with guano manure were preserved through the winter; but those potatoes grown with farm-yard manure partially decayed in the binns, but when brought into the barns kept well; the crops from guano were superior to the others, had a finer skin, and much better in quality. The soil was sandy, and lies near the sea-shore. Several who used guano for potatoes and turnips last year, sowed wheat in the autumn and this open spring, which looks remarkably well, without further manuring. If necessary, in May, a slight top-dressing with weak guano in solution, 1 lb of guano to 8 gallons water, may be given.

Guano, from its having the properties of nitrate of soda and other acids and salts, kills slugs, wire-worms, &c., in the ground, and acts as a preserver and protector of the growing crops in a variety of ways beneficially. I was in Liverpool last week, purchasing 30 tons of the genuine guano, and heard of a Liverpool merchant growing 15 acres of turnips from guano, last season, in Cheshire, and that he had more tops than bottoms, by using 2 cwt. guano per statute acre; and that this year he intends to use 4 cwt. per acre, expecting by this to get both good *bottoms* as well as *tops*. Should this meet the eye of that gentleman, I refer him to Mr. Skirving, seedsman, of his town, whom I do not know. I have no doubt he will tell him that 2 cwt. was too much per acre; or that the large quantity of tops was forced up by the guano; by the seed being sowed too thick, the tops overshadowed the bulbs and prevented the sun ripening them, and thus stunted their growth; there was not room for them to grow in the ground, therefore the guano forced them out of it—hence too much leaf tops; this could easily be prevented by thinning the plants. If it had been farm-yard manure the crop would have failed, and there would have been no tops or bottoms, as the strength of the farm-yard manure would not have forced them, it being a dry season.—I am, Sir, your obedient servant,

NEWBY, 20th March, 1843.

BLAIN LEYLAND.

VARIOUS CROPS FROM GUANO.

Being fully convinced of the stimulating power which the new Peruvian manure guano has upon vegetation, I have tried it to some extent on wheat, turnips, mangel-wurzel, potatoes, grass, clover, &c., and the effects produced have certainly surpassed my most sanguine expectations. I find 1 ton of Messrs. W. J. Myers & Co.'s guano to be equal to 40 tons of the best cow or horse-dung when judiciously applied. For turnips, mangel-wurzel, and potatoes, I applied $4\frac{1}{2}$ cwt. per statute acre without any mixture. After preparing the land (which was in moderate condition) for drilling, the drills were drawn a little shallower than for manure, the guano was sown equally in the bottom of the drill, and then the drill was ploughed up and the turnip and mangel-wurzel seed sown on the top of the ridge, and rolled close down. If the season had been more moist, I think the turnips would have been the best crop of which I have any recollection; as it was, they were the best I have seen in this neighbourhood last year. Mangel-wurzel may be grown to an enormous size by the proper application of this manure. For potatoes, after drilling in the guano, but before the sets were laid down, a woman went down each drill and raked all the soil on it, and then the sets were put in and covered over. Not one of these sets failed in coming up, and were seen above the ground 7 days sooner than those which were manured with good farm-yard manure, and were much stronger and healthy in colour, and had considerably more weight when got up. On grass and clover I found it to answer admirably, and it is my opinion, that, as a top-dresser, nothing can surpass it, either as regards the first cost, or the expense in putting it on the land. I applied about 3 cwt. to the statute acre, and sowed it broad-cast about the middle of March, in the evening, when it was calm. The sooner rain falls after sowing the better, so that the vital properties of the guano be washed down to the roots of the plants. I manured part of the field with the usual quantity of manure, and I can safely state that the part tilled with guano was almost double in quantity, and far superior in quality. I put a little guano on one of the pastures, and in the places so manured the cattle showed a decided preference. With wheat I found it to answer well: $2\frac{1}{2}$ cwt. per statute acre is about the quantity which I applied. Care should be taken to have the guano well harrowed in, so that the seed do not come into immediate contact with it, as in such cases the seed is invariably destroyed. I think it is better to leave the guano after being harrowed for a few days, so that its strength be more generally absorbed in the soil. In a few months after the wheat was sown it presented a most

luxuriant appearance, the crop was good, the straw was much stronger, and the wheat finer than that manured with common dung.

For horticultural purposes it is excellent. I tried it on geraniums and other plants, mixing about half an egg shell-full of guano to each plant of one year old, and less in proportion to younger ones, and found those plants thus manured to be twice as large and considerably stronger at the end of the season than those which were left untouched. A friend of mine, Mr. W. Peacop, near Otterspool, had a frame of cucumbers which were very poor and sickly, when he applied some of the guano in a diluted state, and in a few weeks he had one of the finest crops of cucumbers that could be desired.

In some parcels of guano there are considerable quantities of hard lumps, which are the richest parts of the guano. Before use these should be pulverized on a barn floor, or large flag, and then passed through a sieve. This process makes it mix or sow more equally, and of course acts in a beneficial manner to the growing plants.

From the information I have obtained from persons whose statements may be relied upon, I am confident that the introduction of guano into Great Britain (especially at this critical period when the agricultural interests are at such a low ebb) is one of the greatest boons that can be presented to the farmer, not only as far as regards its astonishing effects are concerned, but for the small compass into which it is compressed. It would have given me great pleasure to have stated the weight, &c. of the crops which I manured with guano, but circumstances have so occurred that I have been unavoidably prevented from so doing.

SAMUEL SCOTSON.

TOXTETH PARK.

The following most interesting letter—written, too, by a lady, who, although deaf and dumb from her birth, has been enabled by a perfect education to read, and, as the beautifully-written letter before us testifies, is a perfect mistress of the pen—containing the gratifying information that guano promises to produce a beneficial effect on the wheat crop succeeding the turnip crop, to which it was applied—has been kindly forwarded by Pierce Mahony, Esq. :—

“ENNISHAG, County Kilkenny, Jan. 23, 1843.

“MY DEAR SIR,—As I know you take a deep interest in any matter relating to an improved system in agriculture, I will lay before you the result of my turnip culture last season, as far as regards the introduction of that recently-discovered manure *guano*. On the 1st of June I got in my general crop, viz., Dale's hybrid and yellow Aberdeens,

selecting both the best seed and farm-yard compost. I reserved half an acre of the same field for the guano, which I did not receive till the 28th June, and on which day I got the latter crop into the ground. The result has been, that the guano has produced a more abundant crop in proportion to the breadth of land, and the plants were as forward early in August as those sown fully three weeks earlier. It may be well to remark, I have now a most promising crop of wheat in the same land, and can see no difference between it and that manured differently, although not sown till the middle of December. The only difficulty I can see in making guano subservient to all the purposes of agriculture (if imported pure), is to have it undergo some chemical process, in order that there may be a standard to test its proper strength; for you must know I used it with vegetables, in the same manner as with turnips, and it burned them similar to a blaze of fire. You would do well to call your friend, Mr. Smith's (Deanston) attention to this matter, the next time you honour his lecture with your presence; and, by sending me a report of the meeting, you will greatly oblige,

"Yours, very sincerely,

"To Pierce Mahony, Esq.

"CHARLOTTE POWER.

"N.B.—The land I farm is rather light, particularly dry in summer, and has a great tendency to limestone at bottom."

Result from a trial of Guano, by Capt. Head, of Lisburne, near Belfast.

I tried guano at the rate of 2 cwt. per acre, well mixed with nothing but road scrapings that had lain in a heap some time. The same quantity was put on a field of turnips as on a field of potatoes—four times the quantity of road scrapings to one of guano—and the results in both cases were very fine and unusually large crops, far surpassing anything in the county of Antrim before known. The soil was old mould. The turnips were generally very large and *sound* (solid) as well as the potatoes. I exhibited them at the Antrim Agricultural Show in August last. I can strongly recommend the guano as an excellent manure; it surpasses any other, and is far cheaper; a man can cover more than an acre a day, which is an immense saving both in expense and labour; no horses or carts are required, and no extra men for loading or spreading, as it can be sown broad-cast.

I have given Mr. Michael Ashcroft, of Bank Hall, near Liverpool, some of the turnips and potatoes from my said crops, and he is rearing seed from them.

6th March, 1843.

General Report of the Chemical Examination of several Samples of Guano, belonging to MESSRS. W. J. MYERS & Co., of Liverpool.

By ANDREW URE, M.D., F.R.S., &c.,
Professor of Chemistry and Analytical Chemist.

In these various analyses, performed with the greatest care, and with the aid of the most complete apparatus for both inorganic and organic analysis, my attention has been directed not only to the constituents of the guano, which act as an immediate manure, but to those which are admitted by practical farmers, to impart durable fertility to the ground. The admirable researches of Professor Liebig have demonstrated that AZOTE, the indispensable element of the nourishment of plants, and especially of wheat and others abounding in gluten, an azotized product, must be presented to them in the state of ammonia; yet not altogether ammonia in the pure or the saline form, for as such it is too readily evaporated or washed away, but in the dormant, or, as one may say, in the *potential* condition, in contradistinction from the *actual*.

Genuine Peruvian and Bolivian Guanos, like those which I have minutely analyzed for Messrs. MYERS, of Liverpool, surpass very far all other species of manure, whether natural or artificial, in the quantity of *potential* ammonia; and, therefore, in the permanency of their action upon the roots of plants; while, in consequence of the ample store of *actual* ammonia which they contain ready formed, they are qualified to give immediate vigour to vegetation. Urate of ammonia constitutes a considerable portion of the azotized organic matter in well preserved guano; it is nearly insoluble in water, not at all volatile, and is capable of yielding to the soil, by its slow decomposition, nearly one-third of its weight of ammonia. No other manure can rival this animal saline compound. One of the said samples of guano afforded me no less than 17 per cent of potential ammonia, besides $4\frac{1}{2}$ per cent of the actual or ready formed; others from 7 to 8 per cent of ammonia, in each of these states respectively.

The guanos of Messrs. MYERS, which I have examined, are the mere excrement of birds, and are quite free from sand, earth, clay, and common salt, reported in the analyses of some guanos, and one of which (sand) to the amount of 30 per cent, I found myself in a sample of guano from Chili.

The Peruvian guano, moreover, contains from 20 to 30 per cent of phosphate of lime, the same substance as bone-dust, but elaborated by the birds into a pulpy consistence, which, while it continues insoluble in water, has been thereby rendered more readily absorbable by the roots of plants, and digestible (so to speak) in their organs.

I have, therefore, no doubt, that by the judicious application of these genuine guanos, mixed with twice or thrice their weight of a marly or calcareous soil, to convert their phosphate of ammonia into phosphate of lime and carbonate of ammonia, as also to dilute all their ammoniacal compounds, such crops will be pro-

duced even upon sterile lands as the farmer has never raised upon the most improved soil by the best ordinary manure. To the West India planter, guano will prove the greatest boon, since it condenses in a portable and inoffensive shape, the means of restoring fertility to his exhausted cane fields—as it has long enriched the poorest districts of Peru.

I respectfully observe that no analysis of guano, hitherto made public, at all exhibits the value of the cargoes referred to above; while none gives the quantity of ammonia dormant in the azotized animal matter of the birds' dung, which, called into activity with the seeds in the soil, becomes the most valuable of its constituents, as a source of perennial fertility. In the detailed account of my analyses of this complex excretion, (now preparing for the press) all the above statements will be brought within the scope of general comprehension. I shall also describe my *Ammonia Generator*, based on the process invented in the laboratory of Professor Liebig, but now mounted on a greater scale, and also my *Ammonia Meter*, which, together, can detect and measure one-hundredth part of a grain weight of absolute ammonia, whether *potential* or actual, in any sample of guano. Meanwhile, the following may be offered as the average result of my analyses of genuine guano, in reference to its agricultural value.

1.—Azotized animal matter, including urate of ammonia, together capable of affording from 8 to 16 per cent of ammonia by slow decomposition in the soil...	50.0
2.—Water	11.0
3.—Phosphate of lime	25.0
4.—Phosphate of ammonia, oxalate of ammonia, ammonia phosphate of magnesia, together containing from 5 to 9 parts of ammonia	13.0
5.—Siliceous sand	1.0
	100.0

Very moist guano has in general more actual and less potential ammonia than the dry guano. The lumps are merely the richest saline parts of the guano concreted by pressure. 17 parts of ammonia go to form 54 of sal ammoniac.

ANDREW URE, M.D., F.R.S.

London, 13, Charlotte Street, Bedford Square,
14th February, 1843.

Guano is in bags of $1\frac{1}{2}$ cwt. each, and is 12s. per cwt. or about 18s. the bag. It is well suited for all crops; to be used with only common care; in all cases to be well mixed (and finely pulverized) with any kind of old spent mould, soil, farm-yard manure, night-soil, sand, sawdust, wood, or weed ashes, charcoal, or any rubbish or soil, top or bottom of any field,

or road scrapings, are excellent. It saves 3 to 500 per cent in expense of manure. Labour, horses, carts, wear, tear, and time, 500 to 1000 per cent more, which can be diverted to more profitable pursuits, besides giving 50 to 300 or 400 per cent larger crops, and brings produce to market one or two months earlier, which is very valuable to the farmer. It is excellent for gardens, cucumbers, grapes, fruit trees, &c. One bag will cover a statute acre—a man or boy can carry it to any field and manure an acre in a day: the crops will never fail by applying this guano manure, as it kills slugs, grubs, wire-worms, &c. D.

ERRATUM.—In our last number, page 598, in comparing guano with other manures, *bone-dust* is quoted “23s. per cwt., 3 cwt. per statute acre.” It should be 23s. *per quarter of 8 bushels, and 24 bushels per statute acre.*

PROPOSED NATIONAL FUND FOR THE DRAINAGE OF LANDS.

The following outline of a petition to Parliament, on the subject of Mr. Blacker's proposed plan for effecting the drainage of the country, has been forwarded to us by a correspondent. The subject is one of great importance at the present moment, and as such we beg to direct the attention of our readers to it.

A FORM OF PETITION TO BOTH HOUSES OF PARLIAMENT,
Recommended for adoption to the Agricultural, Commercial, and Manufacturing Classes of the United Kingdom, namely,

That the late fall in the price of wheat greatly exceeds the rent of the land appropriated to that crop.

That from this circumstance it is quite impossible for any farmer to expect compensation from a mere abatement of rent, when, if the foregoing is correct, the whole would not suffice.

That an increase of produce to be obtained from their farms, appears to your petitioners the only means by which they can be indemnified for the low prices which are now only obtainable for every thing they have to sell.

That the most effectual mode of obtaining this increased produce, is by furrow-draining the land which may require it.

That from several years' experience, it appears, the united efforts of landlords and tenants have not yet been able to make the increase of

produce keep pace with the increase of population : and, that from the difficulties in which both are involved at present, and the great uncertainty of what may be the prices of agricultural produce hereafter, there is less chance now than ever of this desideratum being accomplished.

That a plan has been suggested by Mr. Blacker, of Armagh, for effecting the required drainage, and thereby increasing the produce of the soil, so as to supply ample food, as well as profitable employment for the population, which appears to your petitioners likely to prove efficient in practice for the objects in view.

That this plan appears shortly to be, "That the Legislature should sanction the creation of a new stock, the money to be thereby obtained to be applied solely to the furrow-draining of the lands of the United Kingdom," and that where the landlords and tenants upon any property agreed in the expediency of improving the land in this way, they should be encouraged to do so by the assurance of the cost thereof being advanced from the fund aforesaid, when the said drainage should have been executed and duly inspected, subject to a certain interest to be paid by them, covering the rate at which the money was borrowed, and the expenses of management.

That in order to obtain the money at the lowest rate, the interest should be made a *first* charge upon the properties thereby improved, and the executive be instructed to collect the assessment thus voluntarily submitted to by the individuals benefited, and pay it over to a separate account in the Bank of England, to be by them paid over to the holders of debentures entitled to interest thereon.

That among the many benefits which would appear likely to result from the adoption of the foregoing plan, the following hold a prominent place :—

That additional food and proportionate employment would thereby be undoubtedly obtained. That it would be obtained at the cheapest possible rate, and the least possible outlay, the work being left to parties mutually interested in having it executed in the cheapest and best manner. That the rights of others being in no way affected, all the provisions which have rendered the late general drainage act inoperative are wholly unnecessary. That the assessment being a *first* charge payable by whoever comes into possession of the rents, there is no investigation of titles or law expenses of any kind required. That the improvement contemplated is capable of inspection and mensuration, whereby imposition could be checked ; and an annual examination would ascer-

tain whether the drains were running, and if not, a penal rate might be appointed until a remedy was applied; and a single inspector might easily inspect some hundred acres in a few hours; nor would there be much danger of any stoppage in the drains being left unnoticed, the landlord and tenant being a watch upon each other.

That the only arguments your petitioners have ever heard advanced against the adoption of the plan recommended by Mr. Blacker, are, 1st. that *public money* should not be applied to private objects; 2ndly, that Government interference is a bad thing; and, 3dly, that the Legislature ought to leave individuals to manage their own affairs the best way they could.

Your petitioners reply, that if the public had not suffered grievously for the want of food and employment for the working classes—if it was not plain they might again suffer to the same or greater extent—if their welfare, in short, was not at stake, they would think it unnecessary to trouble your Honourable House with any observations in reply to such objections; but under existing circumstances they feel themselves bound to press your attention. That Mr. Blacker has shown, from official documents, that the United Kingdom has paid thirty millions sterling for the *temporary* relief derived from the importation of foreign corn during the last five years, and that less money expended in improving the soil of the United Kingdom would have afforded, not a *temporary*, but an *annual* supply and an *annual* fund of labour in producing it. That the principle of advancing public money for public benefit has been repeatedly recognised, witness the public money expended for the improvement of Ireland, Scotland, and Canada. If it was public money, therefore, that your petitioners called for, they contend that sufficient grounds exist to show that the good of the community requires it should be granted; but your petitioners positively deny that they call for a grant of any money belonging to the public. They merely call on the Legislature to legalize an assessment, submitted to voluntarily by *individuals* for the payment of the interest of money to be advanced for their use by *individuals*, by doing which not one farthing would be taken out of the public purse, nor one farthing added to the public taxes, and the Legislature would, as Mr. Blacker himself expresses it, merely act as a broker, in bringing together the country gentlemen and the capitalist, giving to the latter a safe and good security at a fair rate of interest, for money that he is now obliged to send abroad in search of investment for the improvement of other countries, and which, under this plan, would be spent in improving our own.

That your petitioners in reply to the second and third objections

alluded to, beg to state that the extravagance generally charged against Government outlays is in no way chargeable against this; the outlay being left to be managed by those whose special interest it is to lay it out with the greatest economy; and as to the third objection, Parliamentary interference has already been recognized in the last session in the very thing under discussion, namely, the Drainage Act, in which many compulsory enactments are introduced, which are quite uncalled for in the plan herein alluded to, which obviates all that can be urged upon that score.

That these objections being set aside, your petitioners beg to state, that if the thirty millions sterling which had been paid for foreign grain had been kept at home, the community would have had these thirty millions, a sum greater than the consumption of our manufactures in all the corn-exporting countries of Europe, for the same space of time, to lay out in clothing and other commodities, and the merchant, the manufacturer, the shopkeeper, tradesman, mechanic, and labourer, would all have been benefited by that expenditure; and, moreover, that however it might be spent—through whatever hands it might circulate—a large portion, perhaps sixpence in every shilling, would have found its way into the public treasury, and saved the nation the grievous infliction which the income tax is now felt to be.

That your petitioners, in conclusion, most respectfully beg to state, that the advantages to be derived by the plan proposed are plain to the understanding of every one, and its adoption, as has been shown, must be beneficial to every class of the community, as well as the landlord and tenant, though they alone are content to be taxed for its accomplishment. That such benefits are not to be lost to the country by ill-founded or superficial objections; and if there should be any members of your Honourable House who shall have the hardihood to assert the demand of your petitioners *should not be granted*, your petitioners humbly request that a committee may be appointed to investigate the whole matter, and to report to your Honourable House whether any specific and positive injury to the nation can arise from acting upon the plan proposed, which can counterbalance the manifest and important advantages which the nation must derive from its adoption, and if so, to state in what the said injury may consist, and how it will operate, so that the public may at the same time be enabled to judge of the magnitude of the evil to be apprehended, and whether in its nature it may be incapable of remedy.

WHEEL-PLOUGHS SUPERIOR TO SWING-PLOUGHS.

From Mr. Pusey's "Progress of Agricultural Knowledge during the last Four Years."—
Journal of the Royal Agricultural Society of England, vol. 3, p. 169.

Four years back, the Scotch iron swing-plough was stated to be the most perfect form of plough. Lord Spencer having remarked that, from his observation of ploughing-matches, he doubted whether swing-ploughs had any advantage over those with wheels, a prize was proposed by the council of the Royal Agricultural Society of England for the best essay upon the subject, which was won by Mr. Handley, who applied the draught-gauge for measuring the strain arising to the horses from different ploughs, and found that those wheel-ploughs he tried inflicted the least labour upon the cattle. Following his example, I tried several ploughs in the same manner, and with the same result. It further appeared that there was a much wider difference in the draught of ploughs than had been suspected, and even that, of two ploughs used by two farmers in the same parish and on the same soil, one was heavier for three horses than the other for two; the old Berkshire plough costing the cattle a muscular strain of 23 stones, while Hart's improved one-wheeled plough was drawn by them with an exertion of 14 stones only. One of Messrs. Ransome's was hardly surpassed by Hart's in lightness, and it certainly made better work. The Scotch were the heaviest of the swing-ploughs. The next trial was by Mr. Freeman, at Haverfordwest in South Wales, who set an old Welsh plough of the country against Hart's. Here again the old plough was more severe for three horses than Hart's was for two. The old plough stood at 20 stones; Hart's at 13. The next experiments were made by Lord Tweeddale, and in these the Yester plough equalled Hart's plough in lightness. The next trial was before our judges at Liverpool, whose words I will quote from their Report:—

“It appears that in almost every case the draught of the wheel-ploughs was less than that of the swing kind; and it must not be concealed that the wheel-ploughs in every case actually turned over more soil than the swing, for the share and sole of the former maintained a flat, horizontal position, whereas all the swing-ploughs leant more or less to the land-side, cutting to a less depth on the right than on the

left-hand side. Consequently, the furrow-bottoms left by the wheel-ploughs were more even than those excavated by the swing-ploughs."

On this occasion, a wheel-plough by Messrs. Barrett, of Reading, was the lightest, marking 22 stones; Hart's the next, 24 stones; a Scotch and a Northampton swing-plough the heaviest, standing each at 40 stones. I cannot but remark how little our mechanists yet know of the draught of their ploughs, when implements could be brought forward to compete for a prize at a great public meeting, some of which gave as much work nearly for four horses as others for two.

The latest published record of trials is a very careful set of experiments by Mr. Hannam, of Dorchester, in Oxfordshire. Here again, as in Wales and in Berkshire, the lightest plough stood at 13 stones, the old Oxfordshire plough at 22 stones, the Scotch swing-plough at 20 stones. The lightest plough in this instance was Messrs. Barrett's.

There only remains the interesting report of our judges on the ploughs which competed at our Bristol meeting. There again, it will be seen that the lightest plough was a wheeled one, Mr. Howard's of Bedford, which stood at 22; the heaviest, a Scotch swing-plough, which marked 44; the next heaviest, another Scotch swing-plough, which marked 36; and, in the words of our judges, "it is worthy of note that the resistance of Mr. Howard's two-wheel was less by 4 stones than that of his swing-plough."

From these repeated trials, which have arisen out of Lord Spencer's remark, we may now come to the conclusion that wheel-ploughs, as he suspected, are superior to swing-ploughs, in ease for the cattle, and are also superior in the work they perform; that the Scotch swing-plough in particular is very severe for the cattle; that, since in three country trials the draught of the ploughs was found to differ as two to three—that is, as two horses to three—more attention is required on the part of our ploughwrights to the easiness of their draught; and lastly, that, since in our two public competitions at Liverpool, and again at Bristol, the draught of some competing ploughs doubled that of the winning plough, as if at Epsom one horse had only run half the course when another was winning the Derby, it appears very clearly that our plough-makers, as a body, are not thoroughly acquainted with the qualities of their own implements, otherwise the race could not be so unequal.

MEETING OF THE DURHAM FARMERS' CLUB.

LIBERALITY OF PROFESSOR JOHNSTON.

The monthly dinner of the Durham Farmers' Club was held at the Rose and Crown Inn, Durham, on Saturday the 11th March, J. Hutchinson, Esq., in the chair. It having been reported that it was the intention of the society to present a piece of plate to J. F. W. Johnston, Esq., for his kindness in giving the members the now celebrated "Lectures on Agricultural Chemistry," the attendance was much larger than usual.

The chairman said it had been the wish of the members of the club to make some acknowledgment to Mr. Johnston for his kindness in lecturing to them, but at the last meeting Mr. Johnston had written a note stating that he could not attend that day, but that he would make a point of attending on the present occasion, and that he would then submit to them a suggestion for appropriating the money which had been subscribed in a way that would not only be useful to them, but which he thought would be of benefit to agriculture in general.

Mr. Johnston on rising was received with much applause. He said, I cannot but feel grateful to you that you should have been desirous to convey to me some lasting testimonial of your approbation for the efforts I have been willing to make in order to familiarize you with the science of agriculture. But as I came forward originally to give those lectures without any other wish than to give information to you, and to do good to agriculture, so it would be far more grateful to my feelings if the money subscribed to present me with a testimonial were devoted to an object similar to that for which I bestowed my own pains. I have elsewhere, in a pamphlet which I now hold in my hands, alluded in favourable terms to what I conceive to be some of the advantages attending farmers' clubs, and, if you will permit me, I will read three or four sentences in which these advantages are briefly stated. [Mr. Johnston then proceeded to read an extract from his published letter to the Marquis of Northampton.] Now, it is in reference to the benefits to be derived from farmers' clubs, in consequence of the members being induced to seek for further information than they can obtain among themselves from those books which treat of agricultural subjects—that I take the liberty of addressing you on the present occasion in connexion with the subject to which I have already alluded. Farmers' clubs are the means of great good to their members, not only in consequence of those direct

results which I have stated in the paragraph read to you ; but from this circumstance in their organization, that it is generally understood that some one person shall prepare himself for bringing forward the topic to be discussed—with all the knowledge he can secure on the subject—and for replying to any objections which may be brought against his views. These clubs are, therefore, a stimulus to the collection and acquisition of information on the part of each member in succession ; and if the means of collecting such information are not within the reach of every individual, it is quite clear that he can neither do justice to himself, to his subject, nor his auditory. Whence, then, is this information to be collected ? I see around me many men of great practical knowledge, whose practical knowledge has been, and can be, perhaps, much more enlarged by the communication of the practical knowledge of their intelligent neighbours ; and yet there is here, perhaps, scarcely a person at once prepared to bring forward any subject which may be proposed for discussion. You must apply to some other source of information before even after a month's notice you can adequately discuss it. And what source can you apply to ? Your neighbours may be few—you may have few opportunities of seeing them, and they may be able to give you little satisfactory information when you find them. But there is one source to which you can repair at any time—at the most convenient and most leisure moment, and from which you can draw abundant supplies. The source to which I allude is that of books. You benefit here from the experience of each other—experience obtained only, perhaps, in the cultivation of half a county. I do not suppose that there are any here whose farms are not all comprised within one-half of the county of Durham ; and even were you to make yourselves masters of all this experience, do you suppose that you would then be possessed of a tithe of that information which is within the reach of the man who reads books, and thereby participates in the knowledge of hundreds and thousands of his fellow farmers in the north and south, in the east and in the west ? I therefore think from this and other grounds, that a library—an agricultural library—is a necessary accompaniment to a Farmer's Club. An Agricultural Library should be considered as an indispensable appendage to an Agricultural or Farmers' Club. It is necessary not only for your own improvement and for working out the objects of such a club as this ; but there are other ends also. There are other ends which will be obtained indirectly by the establishment of such libraries, and of these I will mention one or two. I may appeal to you to look to the agriculture of the county, and bear testimony to the ignorance, negligence, and waste of money, which are too

common among us. I might direct your attention to the large tracts of land in the county lying in an unimproved state. I can appeal to the testimony of practical men now present, who are well acquainted with the state of the agriculture of the county, for the fact that there are 20,000 or 30,000 acres at no great distance from us, which, in their opinion and in that of other practical men whom I have consulted, are capable by skilful management of producing three times as much as they now produce. That, gentlemen, is the character of some of the unimproved parts of the county. And when in my country excursions I look to the improvements which are going on on some farms, I almost invariably find that the otherwise intelligent farmer who is making the improvement lacks some knowledge which farmers in other parts of the county possess. In passing over one field in the neighbourhood lately I saw some draining going on—I saw the lines of drains drawn out, and then the tiles without soles. Indeed I never saw soles at all in the county of Durham. But the impropriety of dispensing with them in this case was very striking. A portion of this land was clay, and a portion sand; and yet in this land all these tiles were to be laid without soles, through the clay, through the sand, and through a mixture of clay and sand. Some of you may believe that it is proper to lay those tiles without soles in clay-lands, but I will appeal to any of you whether in sand you would think of laying down tiles without soles? For my own part I would in no case lay down drains without soles, and in that opinion I am borne out by the great mass of the best-informed practical agriculturists. If I go into another field, I observe another practical error—springing like the former out of a false economy—and I am aware that some of you whom I now address are guilty of doing what I am about to state. I know that there are improvers among you far in advance of their neighbours—who are willing to drain their own fields, while their neighbours never think of laying down drains. These deserve the honourable title of improving men, and yet even these men I find acting on erroneous principles in putting down their drains far too shallow. Drains ought never, if money is not to be thrown away, to be laid down less than from 24 to 30 inches in depth, and yet you and I have both seen many not more than 12 inches. It has been established that drains will not draw unless the bottom be at least 24 inches under the soil, and you can never use the subsoil plough unless with a depth of 16 or 18 inches clear of the draining materials. But I do not say to the farmers, that among them alone it is necessary that a larger diffusion of knowledge should take place, I say it also to the possessors of the soil, the owners of the fee simple of the land. Within the reach of neither

class are the means of extended agricultural information sufficiently placed. I am sure that knowledge is spreading among the owners of farms at the present time more rapidly than at any former period. I know that in some localities the landlords are striving by all possible means to discover and to diffuse the knowledge of the best methods of culture; but in other districts I see landowners—individuals who are proprietors of thousands and tens of thousands of acres—who are indifferent to the progress of agriculture, and under whose auspices no improvements are attempted. The establishment of an agricultural library will assist in remedying this. The diffusion of knowledge through one class will compel the other to attend to improvements also. This diffusion of knowledge will act through the landlord on his tenant, and through the tenant upon the land. I may be told that if an agricultural library were established the farmers would not read the books. But I will not believe such things. I say let us first establish the library for the farmers' use; and I am very sure they will soon take out the books. There are stimulants at work in the state of the times which will compel those to read who are not accustomed to read; which will compel those men to seek some source of knowledge which they have not hitherto possessed. Put me the books into the farmers' houses, and depend upon it somebody will read them. A young race is rising up, let us put the means of knowledge within their reach. If you consider for a moment the state of agriculture in England; if, in other words, you look to the general state of the agricultural body, you will not deny that something should be done to improve agricultural industry. But being satisfied that something ought to be done by yourselves, you will naturally desire to know what has already been done by others, and therefore what may be done by you. If I take you from the county of Durham, to Norfolk on the one hand, or to the Lothians and to Roxburghshire on the other; or even if I take you at once into the far north of Ross-shire, I will show you districts which are producing crops double in average value to those which are raised in the central parts of the county of Durham. And how do they produce them? Not because the soil is better, or the climate more favourable, but because science and skill have been applied to correct the defects of nature. It is because they have consulted the best authorities with the view of ascertaining how to improve their soil. But all that they know—every thing they have done—you will find in the best agricultural works of the day. What they have done, therefore, books will teach you to do, and with equal hopes of success. Now, gentlemen, let me present to your notice another consideration. It is of great importance that you should bear in mind this further point—

that, unless you proceed onward in the path of improvement, you will most assuredly fall further back in comparison with other districts. It is very instructive to study how knowledge is advancing in all other arts. I don't allude to the manufacturing arts alone, but it is a matter of curious contrast to mark the progress made in all other branches of art, compared with the laggard pace at which agriculture has advanced. Let me draw your attention for a moment to two arts intimately connected with your own; and from the advance made in them you will see how necessary it is that you yourselves should lay your shoulders to the wheel also: I allude to the maltster or brewer and the miller or baker. You will find it difficult to get the maltster or brewer to buy your barley. The maltster now knows exactly what will suit his purpose. He knows that the barley grown in the county of Durham will not suit him so well as that grown in other places. The maltsters and brewers in Sunderland, Shields, and Newcastle always prefer the barley produced in other districts, and which comes to them by sea, and if they are compelled by necessity to buy the barley of Durham, the farmers must always be content with a lower price. You will not be surprised to learn that the miller also knows what kind of wheat will best suit his customers the bakers. It is not merely that they require a fine-looking quality of flour; for it is a fact of which they are now competent judges, that the quality of the wheat depends on the quality of the land, and the mode in which the land has been treated. The bakers approve of what is called strong flour. It is a very remarkable fact that the wheat grown in certain districts is much stronger than that grown in others. The flour of this wheat furnishes strong and fine bread for the table. The skilful miller buys this man's corn rather than another man's corn, not on account merely of the quality of the land on which it is grown, but on account of the land being treated in a more skilful manner. Yet with all his skill in selecting, the miller can rarely procure from the wheats grown in this neighbourhood a flour which will satisfy the baker, unless he mix with it a quantity of foreign grain. Now this sort of knowledge seems mysterious at first, but it may all be easily acquired by means of the press. There is one other observation which you may permit me to make—and which I need only make to draw your attention still further to this subject—and that is, that we are not placed in this world as isolated individuals. You have not only your own personal interests to look to, but you have to provide for your families. It is your duty to look forward to their maintenance in comfort hereafter, when it may please God to take you out of this world, that fears and apprehensions for them may not break in upon that peace

which ought to hallow the last hours of life. That is a feeling which every heart must have experienced. Now, in reference to this point, it is stated as a remarkable fact, drawn from an extended observation in agricultural districts, that in every case the sons of those farmers who had been reading men retained or rose above the station of their fathers, while the sons of those who had not been reading men sunk below the stations of their fathers; that the sons of men holding 200 to 300 acres, for example, sunk to the station of labourers in the one case, while in the other they either remained in their parishes and held farms there, or went into the cities and rose above the station of their fathers, or emigrated, and attained to stations of still more permanent comfort. In every case where no special cause intervened, it is said that the sons of reading men either maintained the level of their fathers or rose above that level. I appeal to your feelings as fathers, whether it is not incumbent on you to consider the subject of reading in this its connection with the future welfare of those you love best. I will not dwell on the many other collateral points, in reference to which you would gain benefit by the reading of books; nevertheless, to those who shall attain the desire for reading there will open means of enjoyment, and of instruction in reference to matters not immediately practical, which ought not to be despised when we look to the condition and comfort of those who have to come after us. Among such matters, for instance, is the state of agriculture in foreign countries. Could I convey to you a sketch of that knowledge which a slight observation of other countries during last summer imparted to myself, in regard to the state and prospects of agriculture, and especially of the agricultural population, you would be fully satisfied of the general value of such information even to the practical man. Many useless fears would have been spared to the agricultural body had they possessed such means of knowledge while the alterations in the tariff were in progress in relation to the importation of foreign stock. How many cares and fears would have been spared them had they known the true condition of the cattle-feeding agriculture in foreign countries. Allusion has been made to a wish for a few observations from me on this point. One remark alone will throw a flood of light upon the whole cattle question—that the state of agriculture in Holstein, and in that portion of Denmark which lies to the north-west—Sleswick and Jutland—is such that the stock are not fit to be slaughtered till they are six or seven years of age; whilst in this country, they are fit for the butcher at the age of two or three years. From this one fact alone you may judge what must be the general state of agriculture in that part of the world, what kind of rents can there be

paid, and how far you need to fear such competition in the stock market at home. I now come to the concluding suggestion I have to offer. In what way can a library be established? I have already alluded to your kindness in wishing to bestow on me a permanent testimony of your approbation. You will gratify me still more if you will allow the money subscribed for this purpose to go as a nucleus for the establishment of such a library. With this proposition I beg to close my address to you, and to express a hope that you will not hesitate to accede to it. Mr. Johnston then sat down amidst much applause.

Mr. Arrowsmith briefly proposed the health of Mr. Johnston, which was drunk with three times three, and one cheer more; with one more for the library.

Several gentlemen afterwards addressed the meeting; and a committee was appointed for the purpose of carrying the recommendation of Mr. Johnston into effect.—*Abridged from the Durham Advertiser.*

Few dissentients will probably be found to Mr. Johnston's views on the subject of Agricultural Libraries; his conduct on the occasion is beyond all praise; and it is to be hoped that the Farmers of the Durham Club will so nobly respond to that conduct, that the Library in its extent and selection shall be a lasting token of disinterestedness on the one hand, met by gratitude and the highest esteem on the other.

SONNET.

Leaves thickly strewn, grasses and herbage rank,
Wither'd and sapless, on each hedge-row bank,
In varied masses slowly now decay,
Sadd'ning the mind intent on their display;
Yet when the primrose, in its beauty chaste,
Blooms in strong contrast mid such fading waste,
Its charms augmented o'er the wild spot fling
A halo, heralding the youthful spring,
And cheerful thoughts are stirr'd, mem'ry awakes,
And buoyant fancy of the change partakes:—
Again we strive to scan each bygone year;
Again we would into the future peer;
While flatt'ring hopes, perhaps, will on us flow,
To calm our fears, and mitigate our woe.

JNO. BERRINGTON.

March 20, 1843.

NOTICES OF NEW PUBLICATIONS.

The Veterinarian. London: Longman.

The *Veterinarian* commences the year well. An engraving of a vapour-bath for horses embellishes the January number; and in the notice of it we learn that the "practitioners of veterinary medicines for many years past have envied surgeons the advantages they derived, in their practice, from warm and vapour baths." Many attempts have consequently been made, and although many failures resulted, the obstacles have at last been fairly surmounted. The late Mr. John Field, assisted by Mr. Read, the inventor of the stomach-pump, appears to have made great efforts to attain this desideratum. He, however, never lived to accomplish what he wished; but his brother, William, aware of what John had done, went resolutely to work. "He wanted but the receptacle—the bathing-place"—and "chance threw in his way what his mind, save at a good deal of expense, saw but little prospect of realizing. Being one day at the East India Company's Establishment at the Docks, it struck him all at once that one of their boxes, used for the purpose of conveying their horses on board of ship, would prove the identical horse-bath he had so long been contemplating." One was accordingly removed to his infirmary, which, after a series of experiments, he fully succeeded in bringing to the desired state.

Soon after the first horse had "come out of the bath, the perspiration dripped from every part and pore of his skin, save his head. It was at first doubted that this was really sweat; it was imagined to be nothing but condensed steam. Three circumstances, however, proved that it was secretion, not condensation: the first is, that it does not, in its fullest abundance, make its appearance until some short time after the horse has left the bath; the second is, that the scraper, then used, elicits fluid from the roots of the hair; the third, that the fluid, thus scraped off the skin, has a saline taste, similar to that of the matter of perspiration."

Of the utility of such baths the *Veterinarian* thus remarks:—

"Under what circumstances—in what states of disease or even of health, a vapour-bath may prove desirable or beneficial, one cannot at this early period of its use be expected to offer any satisfactory opinion: the grand desideratum, the employment or application of the bath being accomplished, it cannot be long before we have cases to record of its utility. All veterinary establishments of any magnitude or importance

must now be furnished with steam-baths; the Veterinary Colleges at London and Edinburgh, the Royal Horse Infantry at Woolwich, and every private horse infirmary, can no longer remain without this necessary appendage to their present provisions for the curing of the disease, the soothing of pain, and the comforting of their suffering patients."

This useful periodical abounds with the soundest information relative to the veterinary art. Mr. Percival's Lectures on Horses, Mr. Grellier's paper on the Veterinary Art in India, and Mr. Youatt's on the late Epizotic Diseases in Cattle, Sheep, and Swine, are still continued; and notices of the treatment of peculiar cases, articles on the state of the art on the Continent, &c., &c., render the work of the utmost value to the veterinary practitioner.

The following extract from Mr. Sparrow's paper on Parturition and Tracheotomy, may amuse our readers, and show the folly of applying to a *blacksmith* (!) when a veterinary surgeon may be at hand:—

"June 29.—A bay mare, four years old, the property of a tradesman in this town, had an attack of œdema of the fore extremities, neck and head, which were frightfully distended. The animal had had strangles. The blacksmith who attended was frightened, and ran out of the stable saying '*she is dead! she is dead!!*'

"I was requested to see the mare. I found her in great agony, breathing laborious—the Schneiderian membrane intensely red—and much shifting of position. In order to prevent suffocation, I performed the operation of tracheotomy. Two quarts of blood were taken away, and continual fomentations applied.

"30th.—Not so much swelling in the near fore leg—bowels moderately opened: the animal contrives to suck up some good thick gruel, with small doses of fever medicine. The blacksmith saw the mare with the tube in the trachea, and exclaimed, 'The man whoever put that in must be mad: what good was it?'

"She rapidly improved under the influence of tonic medicines, and on the 10th of July was turned out to grass."

Agricultural Chemistry for Young Farmers. By Cuthbert W. Johnson, Esq., F.R.S., &c. London: J. Ridgway.

A valuable little work, in which the rudiments of agricultural chemistry are made familiar enough for any capacity. Each section is preceded by a few questions and answers relating to the subject treated; and in case the reader meet with any chemical term which he may not clearly understand, he is referred to the appendix, where the difficulty is removed. We heartily wish the book the success it deserves.

The Sporting Magazine. London : Pittman.

The Sportsman in Canada is still continued in the same animated style ; the anecdotes related of Sir John Sherbrooke in the March number, however, do not elevate his character. The Scenes and Sports in Foreign Lands, Bruncheval's Journal of Sport in the West, and Our Fashionable Racing Stallions for 1843, are also continued ; indeed, the work is sustained by so many papers interesting to the general reader as well as to the sportsman, that we are somewhat puzzled to choose a favourite. However, the following description of Hawking, as it is pursued in Ireland, from a paper on the Royal Sport of Hawking, by Roderick Random, p. 229, may possibly be read with pleasure, more especially as Falconry is once more revived :—

“ The first time I beheld a hawking match was in the spring of last year, and the spot selected for the sport was over the open space denominated ‘ The Fifteen Acres,’ why or wherefore I know not, as the plain contains at least from two to three hundred. On arrival at the rendezvous (the high mound nearly opposite the Viceregal Lodge), we found a crowd collected, a multitude of carriages and male and female equestrians, several of the judges, and other official dignitaries. The hawks were seven in number, five natives of this country, and two of Belgium. The falcons were in beautiful order and training, under the care of a falconer from the Duke of St. Alban's Mews. They were all of the long-winged species, and of the *genus* peregrine and falcon gentil. The difference to the eye is very little. The peregrine is stronger in the shoulder, has a larger eye, and deeper set ; his beak is stronger, and talons and legs longer. They were secured by small chains and pins to the ground, and had their hoods on. The small bells secured to the legs by jesses (small straps of leather), and the tinkling sound from them, the whistling and scream of the birds, and the stately toss of their heads, with the little tuft of feathers rising from the hood—the gay parties and splendid equipages scattered over the lordly domain, superadded to the soft spring day—made us feel disposed to applaud the taste of our ancestors in preferring this sport to any other.

“ Mr. O'Keefe having signified his desire to his falconer that the quarry should be flown, he took a pigeon from a basket, and rode into the centre of the open space with Juno, a splendid hawk, on his wrist, and having unhooded her, she soared into the sky, the length of her wings being several feet from tip to tip. Having flown a considerable distance, the falconer waved the lure, which is a dead pigeon on a stick,

and the hawk instantly darted towards it. While on the wing towards him, the falconer let go the pigeon, and a short trial of speed ensued. The hawk, having the advantage of being above the pigeon, made a swoop, and bore the poor pigeon to the ground. The falconer, however, rescued the quarry from the talons of his relentless victor, by adroitly substituting the lure, and having placed food under the wing of the lure-bird, the hawk no doubt was as well satisfied. The food appeared to be raw beef, and the hawk ate a great quantity.

"The second flight was with Vulcan, a falcon gentil, and a better one, as far as contest, than the first. The pigeon flew vigorously, and occasionally baffled the hawk, by keeping close to the carriages, when oftentimes the hawk lost sight of its prey. At length it made a dart, seized the pigeon, and gave it its *quietus*.

"The third flight, the pigeon soared up, and the endeavours of the hawk to rise above were very interesting. Though a powerful strong bird, I thought he was either too fat or slow from want of exercise, for the pigeon flew to some trees away from him, and escaped. The falconer, observing this, cast up his lure, and recalled the hawk. Several other flights ensued, generally terminating in the death of the quarry."

Garden Allotments at Park-mill.—Our readers will learn with pleasure that Messrs. Benjamin Gott and Sons have very recently laid out the field adjoining their factory into gardens for the use of their work-people. The field, which contains above eight acres of ground, is well walled on three sides, and is open to the river on the south. There is one principal walk of four yards wide, running from north to south of it; from which branch out walks of alternately two and four feet wide, dividing each garden. A cottage lodge with a tool-house is about to be built at the entrance from the Wellington-road. The gardens, of which there are above 140, were all numbered and appropriated by ballot, and with each lot was given a copy of Paxton's Cottage Gardener. Tools were also supplied to those who wish to have them, at the cost price of the manufacturer; and, when the ground was thrown open, gardening commenced in good earnest; from which time it has been an interesting scene of bustle and activity. The scheme has given the greatest satisfaction to the work-people, who well appreciate the opportunity thus afforded to them of profitably and agreeably employing their leisure time.—*Leeds Intelligencer*.

ABSTRACT OF MR. RUFFIN'S ESSAY ON CALCAREOUS
MANURES,

And his Accounts of Experiments therewith.

The essay on and accounts of experiments with calcareous manures, of which we here present an abstract, was published in the United States, some ten years ago. It is an exceedingly valuable publication; and at this time, when every effort should be made to improve British agriculture, an abstract of it cannot but be of essential service.

Mr. Ruffin is an American agriculturist of high repute, and evidently well read in agricultural literature, and what is more to the purpose, a deep and in some respects original thinker. His writings are much esteemed by his countrymen; but they are little known on this side the Atlantic.

We shall not follow Mr. Ruffin's arguments in the order in which they stand in the essay, but in an order more convenient for our present purpose.

Mr. Ruffin maintains five propositions; viz.—

1. That soils naturally poor, and rich soils reduced to poverty by cultivation, are essentially different in their powers of retaining putrescent manures; and, under like circumstances, the fitness of any soil to be enriched by those manures, is in proportion to what was its natural fertility.

2. That the cause of the natural sterility of the soils of Lower Virginia is their being destitute of calcareous earth, and their being injured by the presence and effects of vegetable acid.

3. That the fertilizing effects of calcareous earth are chiefly produced by its power of neutralizing acids, and of combining putrescent manures with soils, between which there would otherwise be but little, if any, chemical attraction.

4. That poor and acid soils cannot be improved durably or profitably by putrescent manures, without previously making them calcareous, and thereby correcting the defect in their constitution.

5. That calcareous manures will give our worst soils a power of retaining putrescent manures, equal to that of the best.

These propositions involve the entire theory of calcareous manuring; and if Mr. Ruffin's arguments in proof be good, we have a concise and clear elucidation of the causes of the fertilizing effects of lime.

Proof of Proposition 1.

The different capacities of soils for improvement. The natural fertility of a soil is not to be estimated by the amount of its earliest produce; because several temporary causes operate, when a soil is first brought into cultivation, to retard or advance vegetation. If land be cultivated immediately after trees have been removed from it, the crop will not be so great as it would be if the cultivation were delayed a year or two, in order to permit the roots, leaves, and other vegetable matters to rot, and the soil to be acted on by the sun. For these reasons the *degree of natural fertility* of a soil should be measured by its produce when these temporary causes have ceased.

A certain degree of permanency in its early productiveness, is necessary to entitle a soil to be termed *naturally fertile*.

It is in this sense that I deny to any poor lands, except such as were naturally fertile, the capacity of being made rich by putrescent manures.

Some countries that were noted for their uncommon fertility or barrenness, as far back as any accounts of them have been recorded, still retain the same general character. For some centuries at least, there has been no change in the strong contrast between the barrenness of Norway, Brandenburg and the Highlands of Scotland, and the fertility of Lombardy and Valencia. Sicily still exhibits the fertility for which it was celebrated two thousand years ago.

It seems a necessary inference from the foregoing and similar facts, that the labours of man have been of little effect in permanently altering the characters and qualities of soils, as given them by nature; and most of our practical cultivators, have arrived at the same conclusion by direct experience; but they are content with the fact, and do not enquire into the cause of it.

If *poor natural* soils cannot be durably or profitably improved by putrescent manures, the fact should not only be known but kept constantly in view by every farmer who hopes to improve with success. Yet it is a remarkable fact, that the difference in the capacities of soils for receiving improvement has not attracted the attention of scientific farmers; and the doctrine has no direct positive support from any author on agriculture, English or American. On the contrary, it seems to be considered by all of them, that to collect and apply as much vegetable and animal manure as possible, is sufficient to ensure profit to every farmer, and fertility to every soil. They do not tell us that numerous exceptions to the rule will be found, and that many soils of apparent good texture, if not incapable of being enriched from the farm-yard,

would at least cause more loss than profit, by being improved from that source.

Some persons will readily admit the great difference in the capacities of soils for improvement, but consider a deficiency of clay only, to cause the want of power to retain manures. But that cannot be the case, for some of the most barren and worthless soils are also the stiffest. A poor clay soil will retain manure longer than a poor sandy soil; but it will not the less certainly lose its acquired fertility at a somewhat later period.

It is true the capacity of a soil for improvement is greatly affected by its texture, shape of the surface, and the supply of moisture. Dry, level, clay soils will retain manure longer than sandy, hilly, or wet soils. But however important these circumstances may be, neither the presence nor absence of any of them can cause the differences of capacity for improvement. There are rich and valuable soils with one or more of the latter faults; and there are soils the least capable of improvement, free from objection as to their texture, degree of moisture, or inclination of surface. Unless, then, some other and far more powerful obstacle to improvement exist, why should not all our woodland be highly enriched by the thousands of crops of leaves which have fallen and rotted thereon? But most of our woodland, notwithstanding that vegetable manuring, remains poor; and that one fact, which is indisputable, ought to satisfy all of the impossibility of enriching such soils by putrescent manures only. Some few acres may be highly improved by receiving all the manure of the farm; and entire farms in the vicinity of towns, may be kept rich by continually applying large quantities of purchased manures. But nowhere can a farm be found, which has been improved beyond its original fertility, by means of the vegetable resources of its own arable fields.

A few remarks will suffice on the capacity for improvement of worn lands which were originally fertile. With regard to those soils, I have only to concur in the received opinion of their fitness for durable and profitable improvement by putrescent manures. After being exhausted by cultivation, they will recover their productive power by merely being left to rest a sufficient time, and receive the manure made by nature, of the weeds and other plants that grow and die upon the land. Even if robbed of the greater part of that supply by the grazing of animals, a longer time will obtain the same result. The better a soil was at first, the sooner it will recover by such means, or by artificial manuring. *Whenever we hear of improvements of poor lands by putrescent manures, inquiry will inform us those lands had once been rich.*

The continued fertility of certain countries for hundreds of years, does not prove that the land could not be, or had not been exhausted by cultivation; but only that it was slow to exhaust and rapid in recovering; so that whatever changes may have occurred in each particular tract, the whole country taken together always retains a high degree of productiveness. Still the same rule will apply to the richest and the poorest soils—that each strongly exerts a force to retain as much fertility as nature gave it—and that when worn and reduced, each may easily be restored to its original state, but cannot be raised higher, with durability or profit.

Proof of Proposition 2.

Effects of the presence of calcareous earth in soils. The method which appears the most likely to lead to the causes of the different capacities of soils for improvement is, to enquire—

Whether any known ingredient or quality is ALWAYS to be found belonging to improvable soils, and NEVER to unimprovable; or which always accompanies the latter, and never the former.

If proof of either can be obtained, we shall have good grounds for supposing that we have discovered the general cause of fertility, in the one case, and of barrenness in the other; and it will follow, that if we can supply to barren soils the deficient beneficial ingredient, or can destroy that which is injurious to them, their capacity for receiving improvement will be increased.

All the common ingredients of soils, as sand, clay, gravel, and such qualities as moisture, or dryness, a level, or hilly surface, however they may affect the value of soils, are each found exhibited in a remarkable degree, in both the fertile and the sterile.

The abundance of putrescent vegetable matter might well be considered the cause of fertility, by one who judged only from lands long under cultivation; but though vegetable matter in sufficient quantity is essential to the existence of fertility, it will be found inadequate as the cause of fertility. Vegetable matter abounds in all rich land; but it also abounds in the most barren soil.

But there is one ingredient of which not the smallest portion can be found in any of our poor soils, and which, wherever found, indicates a soil remarkable for natural and durable fertility. *That ingredient is CALCAREOUS EARTH.* And these facts alone, if sustained, will go far to prove that—

Calcareous earth is the cause of fertility, and the cure for barrenness.

On some part of our farms [in Virginia] touching tide-water, either muscle or oyster shells are found mixed with the soil. The proportion

of shelly land in the countries highest on tide-water, is very small; but the small extent of those spots does not prevent, but rather aids, the investigation of the peculiar qualities of such soils. Spots of shelly land, not exceeding a few acres in extent, could not well have been cultivated differently from the balance of the fields of which they form parts; and therefore they can be better compared with the worst soils, under like treatment.

Every acre of shelly land is, or has been, remarkable for its richness, and still more for its durability. There are few farmers among us who have not heard described tracts of shelly soil on Nansemond and York rivers, which are celebrated for their long resistance of the most exhausting tillage, and which still remain fertile, notwithstanding the injury which they must have sustained from the severe treatment of them. We are told that on some of those lands, corn has been raised every successive year, *without any help from manure*, for a longer time than the owners could remember, or be correctly informed of. But, without relying on any such remarkable cases, there can be no doubt that every acre of our shelly land has been at least as much tilled, and as little manured, as any in the country, and that it is still the richest and most valuable of all our old cleared land.

The fertile, but narrow strips along the banks of our rivers (which form the small portion of our highlands of first-rate quality) seldom extend far without exhibiting spots in which shells are visible, so that the eye alone is sufficient to prove the soil of such places to be calcareous. The similarity of natural growth, and of all other marks of character, are such that the observer might very naturally infer, that the former presence of shells had given the same qualities to all those soils, but that they had so generally rotted, and been incorporated with the other earths, that they remained visible only in a few places, where they had been most abundant. The accuracy of this inference will hereafter be examined.

The natural growth of the shelly soils (and of the adjacent of similar value) is entirely different from that of the great body of our lands. Whatever tree thrives well on the one, is seldom found on the other class of soils, or, if found, it shows plainly by its imperfect and stunted condition, on how unfriendly a soil it is placed. To the rich river margins the locust, hackberry, and papaw, are almost entirely confined. On the woodland, only a mile or two from the river, not a locust is to be seen. On shelly soils pines and broom grass cannot thrive, and are rarely able to maintain the most sickly growth.

Some rare exceptions to the general fertility of shelly lands are found

where the proportion of calcareous earth is in great excess. Too much of that ingredient, causes even a greater degree of sterility than its total absence. The exception to the general fertilizing effects of calcareous earth, would scarcely require notice, but to mark what may be deemed a contradiction.

With my early impressions of the nature and composition of soils, derived from the general descriptions given in books, it was with surprise and some distrust, that when first attempting to analyze soils, in 1817, I found most specimens destitute of calcareous earth. The trials were repeated with care and accuracy, on soils from various places, until I felt authorized to assert without fear of contradiction, that *no naturally poor soil, below the falls, contains the smallest portion of calcareous earth.*

1. Soil, a black clayey loam, from the top of the high knoll at the end of Coggin's Point, on James' river, containing fragments of muscle-shells throughout. Never manured, and supposed to have been under scouring cultivation and close grazing from the first settlement of the country: still capable of producing 25 to 30 bushels of corn, and well suited for wheat. 1000 grains, cleared by a fine sieve of all coarse shelly matter (as none can act on the soil until minutely divided) yielded sixteen one-ounce measures of carbonic acid gas, which showed the finely-divided calcareous earth to be 32 grains.

2. 1000 grains of similar soil from another part of the same field, gave 24 grains of finely divided calcareous earth.

3. From the east end of a small island, at the end of Coggin's Point, surrounded by the river and tide marsh. Soil, dark brown loam, much lighter than the preceding specimens, though not sandy; under like exhausting cultivation; then capable of producing 30 to 35 bushels of corn; not a good wheat soil, 10 or 12 bushels being probably a full crop. 1000 grains yielded 8 grains of coarse shelly matter, and 82 of finely-divided calcareous earth.

4. From a small spot of sandy soil, almost bare of vegetation, and incapable of producing any grain, though in the midst of very rich land, and cleared but a few years. Some small fragments of fossil sea-shells being visible, proved this spot calcareous, and induced an examination of it. 400 grains yielded 87 of calcareous earth, nearly 22 per cent. This soil was afterwards dug and carried out as manure.

5. Black friable loam from Indian Fields, on York river. The soil was a specimen of a field of considerable extent, mixed throughout with oyster-shells. Though light and mellow, the soil did not appear to be sandy. Rich, durable, and long under exhausting cultivation.

1260 grains of soil yielded—

	Grains.
Coarse shelly matter, separated mechanically	168
Finely-divided calcareous earth.....	8

The remaining solid matter, carefully separated, by agitation and settling in water, consisted of—

Fine clay, black with putrescent matter, which lost more than one quarter of its weight by being exposed to a red heat....	130
White sand, moderately fine.....	875
Very fine sand	20
Lost in the process	36
	1061

6. Oyster-shell soil of the best quality from the farm of Willis Cowper, Esq., on Nansemond river; never manured, and supposed to have been cultivated in corn as often as three years in four, since the first settlement of the country; now yields 30 bushels of corn to the acre, but is very unproductive in wheat.* A specimen taken from the surface to the depth of 6 inches, weighed 242 dwt., and consisted of—

	Dwt.
Shells and their fragments, separated by the sieve	126
Remaining finely-divided soil.....	116

500 grains of the finely-divided part, consisted of—

	Grains.
Carbonate of lime.....	18
Siliceous sand, none very coarse	330
Impalpable aluminous and siliceous earth.....	94
Putrescent vegetable matter, none coarse or unrotted ...	35
Loss	23
	500

It is unnecessary to cite any particular trials of our *poor soils*, as it has been stated that all are entirely destitute of calcareous earth, excluding the rare, but well-marked exceptions of its great excess, of which the soil 4 in the foregoing examinations is an example.

Unless, then, I am mistaken in supposing these facts universally true, the certain results of chemical analysis, completely establish these general rules, viz.—

That all calcareous soils are naturally fertile and durable in a very high degree; and—

That all soils, naturally poor, are entirely destitute of calcareous earth.

[To be continued.]

* When corn is named, it must be understood that it is *Indian corn*.

CORROBORATION OF THE EFFECTS OF GUANO.

SIR—I have watched with satisfaction and attention the introduction of guano, and its use as a most potent, saving, safe, and universal fertilizing manure. Its most wonderful properties, and magical effect in reviving vegetation in a drooping and dying state, are quite astonishing. I have enquired from Mr. Hazelwood, of Withy Brook, near Coventry, whose result is recorded in your last number, p. 601, and find farmers came 10, 20, 20, and even 30 miles round, to see his fine turnips; and he is now using five times the quantity of guano this year. I have visited the field of Mr. John Pritchard, of Kirkdale, near Liverpool, and find one bag of guano, cost £1 1s., saved him a loss of £20 per acre; as recorded in page 603 of your last volume. I have been using potatoes in my family for the last three months, grown from guano in Kerry, by Mr. Robert Bell, (see pp. 600 to 603, vol. 6,) and the taste more like bread flour than any Lancashire potatoes I have ever used. Indeed, I have tested them, and find them to contain 10 per cent more farina; and as this article is now used extensively as starch in the manufacture of cotton goods, it is highly important that the Lancashire farmers should know this fact.—I remain, Sir, yours, &c.,

WILLIAM DANSON.

27, Great George Street, LIVERPOOL,
March 24, 1843.

The sales of guano for the week ending 24th March, are 250 tons.

Draining by the Plough.—On Tuesday, the 14th of March, Mr. Alexander's two drain-ploughs were put to work on a farm in Scotland, held by Mr. Robert Forrester. The neighbouring farmers sent their horses; each plough having twelve. The first, or top plough took out from 14 to 15 inches; the second, or bottom plough from 11 to 12. In less than seven hours after starting (including 20 minutes for feeding) 10,080 yards of drains were ready for the tiles, excepting the removal of the small earth from the bottom with the cleaner, and opening the parallel drains into the main drains with the spade. The following is an estimate of the cost, both with the spade and with the plough:—

Opening 10,080 yards of drains with the Spade, and laying in the tiles, at 11d. per 36 yards of drains	£12 16 8
Opening 10,080 yards of drains with the Plough—	
12 pairs of horses at 3/ per pair, including drivers	4 16 0
Two conductors to each plough, at 2/ each	0 8 0
Man cleaning drains and laying in tiles	2 15 0
	7 19 0
Balance in favour of plough drains	£4 17 8

THE BRITISH FARMER'S MAGAZINE.

New Series.

VOL. VII.

JULY, 1843.

NO. XXVI.

ON MANURES AND THE NUTRIMENT OF PLANTS.

Having brought the Catechism of Chemistry to a close (see No. 25, p. 73), it will to a certain extent be needless to attempt the elucidation of terms which now occur in many periodicals.

Without other preface then, a few paragraphs are extracted from a recent article in the Gardeners' Chronicle, translated from the German of Professor Sprengel, on the subject of *vegetable* manures. It will be curious to notice the complication of substances traced by analysis in organic bodies; none of which were apparent in the growing vegetables—first, in "*Bean-straw*.—100,000 parts of not quite ripened air-dried bean-straw contain 51,000 parts of woody fibre, 1000 parts of wax, and 48,000 parts of substances soluble in water and the lye of potash—the latter most probably consists of 1000 parts of nitrogen, as Boussingault has found in 100,000 parts of green-pea-straw 1790 of nitrogen. This great quantity of nitrogen in bean-straw is more certain, because beans and peas belong to the same natural family of plants, and because experience has shown good bean-straw to be as nutritive as pea-straw.

" 100,000 parts of the straw contain of mineral substances :—

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	<i>Parts.</i>
" Silica.....	0·220
Lime.....	0·624
Magnesia.....	0·209
Potash	1·656
Soda	0·050
Alumina	0·010
Oxide of iron	0·007
Oxide of manganese	0·005
Sulphuric acid.....	0·134
Phosphoric acid	0·026
Chlorine acid	0·008

" In all 3·149 of mineral, or *inorganic* constituents obtained by combustion, and, therefore, left in the ashes. These substances existed, of course, in the living vegetable, but were masked, or hidden by being in a state of combination with acids, &c. ; just as potass is present in the grape, in the juices of sorrel and rhubarb, but combined with the tartaric and oxalic acids, as *bi-salts*."

In another paragraph we are told that " 100,000 parts of pea-straw contain of mineral substances :—

	<i>Parts.</i>
" Silica.....	0·996
Lime.....	2·730
Magnesia.....	0·342
Potash and soda.....	0·235
Alumina	0·060
Oxide of iron	0·020
Oxide of manganese	0·007
Sulphuric acid.....	0·337
Phosphoric acid	0·240
Chlorine acid	0·004

" In all 4971 parts of mineral substances.

" 100,000 parts of pea-straw, therefore, contain nearly 5 lbs. of those very mineral substances of which the plants generally do not find a sufficiency in the soil. If we consider, moreover, that pea-straw also contains a considerable quantity of nitrogen, and that with 3000 lbs. of straw 54 lbs. of nitrogen are carried on a Magdeburg acre, we see clearly why this straw is so valuable. Pea-straw is, however, chiefly used as fodder, not as litter, and only the more woody parts rejected by cattle find their way to the dunghill. Therefore the soil of pea-straw fed cattle will be better than that from rye-straw, &c. It does not remain longer in the soil than rye or wheat-straw."

In the foregoing statements we perceive a difference between the quantity of the mineral substances found in bean and pea-straw, amounting to 1·822 parts in favour of the latter; chiefly arising from

the disproportions of lime, soda, and potassa. Caution, however, must be used in taking these assumed data as standards of comparison ; for, as all the mineral inorganic constituents must, we presume, be derived from the soil, the great variety of earths, both in texture and chemical condition, will mainly regulate the quantity of such constituents in plants grown in different localities. The instruction to be gathered from such analytic results consists chiefly in the assured fact that chemical science affords the means of discovering the components of any vegetable ashes, and of the soil in which the plants have grown.

Thus, presuming a crop of beans or peas to have flourished luxuriantly and productively (other casualties, from blight, &c., considered) in any known soil, the analysis of the haulm will tend to demonstrate the nature of those substances which ought in reason to be applied as manure. The *induction from facts* is in only incipient progress, but it must be viewed as the basis of scientific agriculture.

But we again urge the necessity of restricting the operations and deductions of chemistry to their legitimate object ; for *we involve the science in inextricable difficulties, and place it in a false position, if we apply it to the interpretation of vital phenomena.*

Chemistry has already discovered the components of inorganic products ; and the passages above quoted give promise of still more important discoveries : therefore it is proved to be essential, and as such ought to be incorporated with the other objects of those who attempt to establish a system of agriculture.

From the results of analysis, though subject to local contingencies, and some trifling errors inevitable to complicated processes, it will be evident that, until farming have made great advances, the cultivator should employ those compound manures which are known to contain all the elements of vegetable structure. Each plant may then select for itself, and this it will do if deposited in ground which is congenial to its habits. We use the term select in a general sense, because we are absolutely ignorant of the principles of vital function. Of volition we know nothing ; of attractive agency we are equally ignorant of causes ; and, therefore, modesty compels the true philosopher to observe effects, and to arrive at conclusions solely from observation.

Nevertheless it will not be impertinent to observe that, as all chemical decompositions and combinations involve electric development, the agency of that mighty agent may be more than suspected : present, it is everywhere, and therefore it must perform an important office in the phenomena of vegetable growth and nutrition.

The agency of *nitrogen* has become a serious consideration of late; especially since the publication of Liebig's Organic Chemistry. To that writer we are chiefly indebted for the various suggestions we now meet with in the periodicals of the day, and particularly upon the *fixation of ammonia*. That nitrogen is a component of animal muscle cannot be doubted—the experiments of chemists from the time of Priestley have established the fact; and, therefore, it is reasonable to conclude that any kind of food which contains the greatest proportion of nitrogen must be in a like degree profitable to the grazing farmer: but we much question whether the fixation of volatile ammonia in dunghills or manure-tanks can be of any importance to the farm; in as much as whatever portion is carried into the atmosphere will either be duly elaborated therein by natural agents, or returned to the earth with rain and condensed aqueous vapours.

We perceive in the queries which now abound in the columns of the Mark Lane Express, (and they are to be viewed as expressive of that spirit of research that marks an onward course), questions to the following purport—"What materials are the night-soils and urates sold in London prepared with? If prepared with lime, much of their valuable properties are lost in the liberated *ammonia*!"

Here it may be observed, that an advertising manufacturer for sale can never be expected to reveal the secrets of "the prison house." Gain is his direct object, "the schoolmaster at large" is a stranger to it; and therefore if any one desire to know the constituents of the compost he employs, he must for the present be content to employ substances, the analysis of which has been determined in the chemical laboratory. We still are ignorant of the specific products of each individual organization; therefore, it will be wise to persist in the employment of farm-yard and stable manures, saturated with urine; and to sprinkle over the fermenting heaps, common salt, nitrate of soda, and gypsum. The last-named article is described in the Catechism of Chemistry, and a process is there also given for its artificial preparation.

As to night-soil, it is unquestionably one of the best fertilizers known, but in the recent state, or that in which it is taken from its ordinary receptacles, the offensive odour becomes very objectionable.

One of the readiest, and perhaps most effectual methods to obviate the inconvenience, and at the same time to retain all the valuable liquids of the soil, is to erect a brick tank on a level with the privy, and connected by a side-opening. This tank can be constantly covered by rough slabs and earth; and as the soil accumulates, the boards can be removed, and the contents of the tank carried to a pit in which there is

a quantity of good light loam, or loam and chalk. This earth will absorb the swillage; and by adding a thick superstratum of similar earth upon the night-soil, every portion of the fluid will be retained. In a few months the whole contents of the pit may be turned, worked up, and conveyed to the land as dress. Night-soil so prepared must be one of the most powerful manures in nature, because it contains not only the nitrogenous elements of the urine, but all those matters which constitute the organic products of vegetables. If the fixation of ammonia be an object, it can be effected at little cost, by sprinkling the mould and night-soil with sulphuric acid diluted with eight times its weight of water; and if chalk be present, gypsum (*sulphate of lime*) will also be produced.

The economy of every particle of night-soil ought to be urged, not only in consequence of the existing waste of that most useful substance, but by the example of the Chinese.

On this subject, and upon guano, Liebig observes—"The sterile soils of the South American coast are manured with a substance called guano, consisting of *urate* of ammonia, and other ammoniacal salts, by the use of which a luxuriant vegetation, and the richest crops are obtained. The corn-fields in China receive no other manure than human excrements. But we cover our fields every year with the seeds of weeds, which, from their nature and form, pass undigested along with the excrements through animals without being deprived of their power of germination, and yet, it is considered surprising, that where they have once flourished, they cannot again be expelled by all our endeavours: we think it very astonishing, while we really sow them ourselves every year. A famous botanist, attached to the Dutch embassy to China, could scarcely find a single plant in the corn-fields of the Chinese, except the corn itself."

If we admit that the liquid and solid excrements contain 3 per cent of nitrogen, then in one year, each human being, at an average, is supposed to produce more than $16\frac{1}{2}$ lbs. of nitrogen, a quantity sufficient to yield the nitrogen of 800 lbs. of wheat, rye, oats, or of 900 lbs. of barley. Liebig cites these data upon the authority of Boussingault, and he thus reasons upon them:—

"This is much more than it is necessary to add to an acre of land in order to obtain, with the assistance of the nitrogen absorbed from the atmosphere, the richest possible crops every year. Every town and farm might thus supply itself with the manure which, besides containing the most nitrogen, contains also the most phosphates; and if an alternation of the crops were adopted, they would be most abundant. By

using, at the same time, bones and the lixiviated ashes of wood, the excrements of animals might be completely dispensed with."

We very much question the correctness of the assertion that weeds are absent from fields in consequence of the use of human excretions. There is no one circumstance in the economy of nature more wonderful than the production of weeds. We have read of a crop of clover appearing at once in sites whereon a single plant of clover was never seen to grow, solely by the accident of fire consuming a quantity of fern or underwood! Without vouching for, or attaching much credence to, the fact, it might be reasonably conjectured that the inorganic salts of the vegetable ashes so produced, might act as a stimulant to the growth of clover; but even this hypothesis would involve the inevitable necessity of the pre-existence of clover-seed at a very little depth below the surface of the soil. However this may be, we have proof incontestible in many parts of Berkshire where chalk abounds, that fresh earth raised from the depth of many feet, and deposited upon the land, invariably produces an immense crop of charlock. On a neighbouring farm, occupied by a very active and observant person, attention was attracted last year by the sudden appearance of turnip plants upon a mound of earth raised from a certain depth, in a waste part of the farm where no tillage had been carried on for numbers of years!

We are totally ignorant of the laws of physiology; but every phenomenon affords demonstrative proof that the earth is replete with organic germs of life. *Causes* are hidden—all that we can expect is, that from a close observance of effects we arrive at certain experimental conclusions which may be reduced to a system. Chemistry analyzes dead and effete matter; it discovers residual products, upon which we are enabled to found a rational theory of manure; and herein the agriculturist is deeply indebted to the chemist—for upon his researches will be erected the science of agriculture.

We have now to offer a few remarks upon the agency of manures, as suggested by the phenomena of vegetable attraction.

In the modern theory of physiology it is generally admitted that all the component parts of vegetables are derived—first, from solutions within the earth, and conveyed in the form of crude sap by the vessels of the root, stem, and leaves, and then from gases taken up by the absorbent power of the leaves themselves.

Liebig has dwelt forcibly upon the latter point, assuming it as fact that the bulk of carbonic acid which a plant requires is derived from the atmosphere through the agency of the leaves.

That leaves, and the tissue of the bark itself *can* absorb, we have

proof in the destructive effects produced by certain gases and fluids :— for instance, an orange tree was infested by the turtle insect (scaly coccus), to remove which, an experiment was made with a weak solution of arsenic in water, applied by a small brush : in a few hours the plant and its roots perished. A Cape jessamine (*Gardenia*) was attacked by the same pest, or the mealy scale. It was covered with a bell-glass and a small quantity of the vapour of pure ammonia was admitted : almost immediately the leaves assumed an intensity of verdure that was in itself beautiful. But, though the plant had remained during a few minutes only under the glass, the leaves gradually became sickly, and fell. The shrub itself never rallied, but languished during the season, and died.

It is still questionable whether leaves absorb at all, as a vital condition of their structure. They are essentially the organs of transpiration, as may be proved in many instances by the quantity of water which is deposited on the upper surface of one leaf when another leaf rests upon it. It does not, indeed, appear possible to support the life of any ordinary plant by the most vaporous atmosphere which art can produce, unless a due supply of water be afforded to the roots.

A plant, however it droops, may, in most instances, be immediately revived by watering ; but, as vegetable structure contains a great proportion of woody matter, it is evident that water alone cannot suffice for the purposes of growth and increase of bulk. The question then occurs—Is *carbonic acid* (according to the modern notion), that is, *carbon* united to *oxygen*, the pabulum and origin of all the woody matter of vegetable structure ? We have seen that manures, whether in the form of stable-dung, decaying leaves, and vegetable matter, night-soil, or guano, contain all the elements required, and these are deposited in the ground ; in which they are by a slow process converted into the substance which is called *humus*. But *humus* is insoluble, or nearly so, in water, and, therefore, if it be the proper food of plants, it must either be decomposed or reduced to a liquid. If the former, it is not for a moment reasonable to suppose that the sole product is carbonic acid ; for what then would become of the hydrogen ? If the latter, the dissolved *humus* must be a dark-coloured liquid which could by no means enter the organs of the roots, and, in fact, has never been traced therein.

A modern writer says that, “ from whatever source the oxygen and hydrogen of vegetable substances are derived, the carbon comes from the decomposition of organic substances, either animal or vegetable ; and these, in a certain state of decomposition, afford the supply of carbon

by which the plant increases and secretes its juices. As in the animal digestion, the chemical affinities, as observed in the raw materials, seem all to be set at defiance, or greatly modified by a vital energy of the organ. So, in the conversion of the simple vegetable sap, differing *but little from pure water*, into the various substances which are produced by vegetation, no analogy can be drawn from the experiments of the laboratory. Nature alone has the secret of transformation, and it is only by watching her operations, and endeavouring to imitate them, that we can hope to come to useful practical results."

Dr. Henslow, in some recent letters, has taken a similar view of the transmutation of crude sap; and great truth is found in several of the above stated particulars; but why insist so exclusively upon the importance of *carbon*? Why imply that from it alone, or chiefly, the plant increases in bulk and secretes its juices? What, in this restricted view, becomes of all the hydrogen, nitrogen, and a great portion of the oxygen?

Humus, when mixed with staple earths, becomes decomposed, even if plants be absent, slowly or rapidly, according as the soil is strong and unctuous, or loose and sandy; but, during the growth of vegetable bodies, it is acted upon by a new power, which it would not be rash to consider identical with that of voltaic electricity. Now, if we may indulge in this view of the vital action of the roots, the humus is so electrized that all its elements are separated, and enabled to combine in other forms, wherein the hydrogen and carbon, carbon and nitrogen, unite, while oxygen and hydrogen are developed in the proportion required to form water.

The decompositions and recombinations being electrical, the new compound now constituting sap is also conducted by the same power into the vessels of the roots, whence it passes into the leaves, and undergoes those changes and modifications which are specific to each individual plant.

Whether the vital *principle* be an emanation from the Creative First Cause of life, or a power, *sui generis*, inherent in the plant, we know not, and must be content to wonder and admire. But, in as far as analogy can trace a resemblance, we perceive an efficient agent in a disturbance of the electric relations of the elements; and thus we obtain a glimpse of a rational system of manuring, and of the mode by which the components of manures are converted into vegetable food.

To sum up in a few lines all that has been discovered or suggested on the phenomena of vegetable nutriment, it appears evident that little or

nothing has been positively ascertained of the vital functions, or of the courses of the sap. Conjectures have been hazarded in consequence of microscopic observation of certain movements in the vessels of a few singular plants—the *chara*, for instance—but we thence arrive at no general conclusions. All plants cultivated upon the farm contain, or, at least, develope, the three great elements of organized matter—i.e., oxygen, hydrogen, and carbon. Several contain inorganic phosphates, and a portion of flint, which we presume was conveyed from the earth in a state of union with potassa (silicate of potash), wherein flint is very soluble by water.

Hence, straw is indicated, because straw contains flint, and thus we have practical evidence of the great utility of farm-yard dung.

If the surest evidences be derived from the induction of facts, then it follows that the analyses of chemistry must be the most unerring index of the farm; and, therefore, we claim the necessity of a scientific education, if the sons of agriculture are ever destined to rank among the learned of the day, and their *art* to be established upon sound principles.

Enough has been already discovered to prove that various plants require different modes of treatment; and we are quite sure that, although we must remain subject to adverse seasons and temporary contingencies, empiric routine no longer is sanctioned, and the results of certain combinations can be pretty accurately foreseen. A vast field remains open to experimental research, but we have received ample encouragement, and may proceed therein with a well-grounded hope of not only overcoming every difficulty, but of witnessing a boundless increase in the quantity of the noblest productions of husbandry.

J. TOWERS.

April, 1843.

ON THE BEST METHOD OF PREPARING A DUNGHILL.

We have so continually occupied our pages with discussions concerning manures, that some, we fear, regard the subject as more than exhausted. The question, however, is, in our own opinion, but just opened; most of the experiments that have been recorded are rather to be regarded as incentives to further enquiry than as satisfactory solutions of one of the most important—if not the most important—questions connected with cultivating the soil. Gardeners and farmers are alike interested in it, and alike capable of conducting the enquiry; the

only difference is, that more expense may be profitably incurred by the gardener than by the farmer—or at least that seems to be the case.

Whatever the value may be of the many artificial manures—and we are the last to question the efficiency of the phosphates, nitrates and sulphates, of guanos, home-made or sea-borne, and all the remnants snatched by the chemist from corruption—whatever the value of them may be, it must never be forgotten that they *cost money*. The cultivators of the land cannot make such substances: for them the true laboratory is the farm-yard—their pneumatic chemistry is confined to the dunghill. The good farmer will use up what he has got before he goes to market for more. He will spend his money upon labour, and only extend his outlay when all the resources of labour are exhausted; then, such agents as artificial manures become invaluable, and not till then. It is most improvident to poison cattle by draining away the strength of manure into a horse-pond and then to run to market for artificial compounds; it is unreasonable, after wasting money thus, to cry out for protecting duties, upon the ground of the peculiar cost of English farming.

We are led to these remarks in consequence of finding that the country is at last becoming alive to the importance of such considerations, and that gentlemen are in many cases strenuously endeavouring to persuade their tenantry to turn their attention to the better preservation and preparation of manure. In Cheshire, Sir Philip Egerton is about to offer three premiums to his tenantry “For the most economical and effective system of *collecting, improving, and employing* the solid and liquid materials within their reach, adapted to fertilize and improve the land.” We understand that one premium will be for tenants under £20, another for those under £100, and a third for tenants above £100 a-year. We doubt not that so excellent an example will be quickly followed, and therefore we shall at once proceed to state what we conceive to be the most advisable steps for the competitors to take in order to meet the views of such landlords.

The great principle to start from is, *that all the best parts of manure will either run away or fly away*. The first are seen in the fluids that drain from ordinary dunghills, the second may be discovered by the sense of smell: for the offensive exhalations of manure-heaps are produced in consequence of valuable fertilizing substances flying away in an invisible condition. Therefore, a well-made dunghill should neither leak nor smell.

A second and not less important point to be remarked is, *that everything is a manuring substance which has ever been alive*. The dead re-

mains of animals and plants are each in their way equally valuable. People often forget what the origin is of substances in very common use, and do not recognise the fragments of plants and animals, though they are every day before their eyes. For example, coals are the remains of plants; soap is composed of certain parts of plants and animals, its potash or soda having been obtained from one, and its fat from the other. Manchester goods are made of threads taken out of plants, just as woollen cloths are prepared from threads pulled off animals; therefore, cinders, soap-suds, cotton and woollen rags, are manuring substances just as much as charcoal, stable-litter, or bones.

The third point to attend to is, that *all manuring substances must decay, before they can act as food for plants*. If a man, in his zeal for gardening, were to put his leg into a vine border, and to sit with it there all his life, his grapes would make him no return for so uncomfortable a position. But let the surgeon cut it off and bury it there, the effect would be presently seen in a deeper green, and stronger wood of his vines. Now the obvious reason of this is, that, in the first case, the leg remained alive and could not decay, while in the second it had lost its life and immediately began to rot. So it is exactly with all other things; they must decay before they can become manures. Fresh straw is not a manure—rotten straw is excellent; fresh saw-dust is useless, when decayed it is of considerable value.

These three principles seem to be those on which the whole art of preparing and economising manure depends. Matter which once had life, whether the carcase of a horse or a basket-full of grubs, an ermine robe or a bundle of rags, will equally become manure; but they must be made to decay, and that being effected, nothing must be allowed to run away in the form of fluid, or to fly away in the disguise of a smell. We conceive that the following plan will effect these objects in the most economical manner.

Mark out the piece of ground on which the dunghill is to be made, on a good slope if possible, and close by a pond. Cut a gutter all round, 6 inches wide and 4 inches deep, and puddle it with clay, so as to make it water-tight. Then, at the *lowest part*, outside the place where the dunghill is to lie, dig a good-sized sink-hole, about 18 or 20 inches deep; let this also be well puddled, and connected with the gutter already spoken of. Things being thus prepared, throw down a layer of such manuring substances as you may have, about a foot deep, and tread them well down; then sift or scatter over it some fixer, (what that is will be explained presently), and finally, water it well. Then add another layer of manuring substances, tread down, sift on the fixer,

and water well as before. In this manner go on with layer after layer, till the heap is of the desired height—always treading and watering as directed. When the work is completed, a firm mound of manure will be formed, surrounded by a gutter communicating with a sink-hole.

Probably during the operation of making the manure-heap, some water will have drained away; in that case, it will have run into the gutter and collected in the sink-hole. If so, let a labourer scuppet the water out as the work proceeds, and throw it back upon the dunghill. Every morning the sink-hole should be examined, and the ~~drainage~~ *drainage* that has collected in it be scuppetted back over the heap. If the hole is not large enough to hold all the water that drains off, another can be made near it; *none of the drainage must on any account be lost.* If the heap is properly made, it will heat gently, not strongly; but if it becomes very hot, plenty of water must be thrown over it, caught up in the sink-hole, and scuppetted back, again, and again, and again; and, whether it heats or not, it should have, at least once a week, for a month or six weeks, a good quantity of fluid of some kind thrown upon it, so as to keep it *thoroughly wet*, it being at the same time well drained. Pot-boilings, soap-suds, or such refuse, are much better than common water; but urine is infinitely preferable to either. If it were possible to collect this fluid and use it instead of water, from the beginning to the end, so much the better.

By these contrivances nothing is allowed to leak away or drain off, but the dunghill is enabled to become a soft pasty mass, holding fast all that belongs to it, except what might fly away. To catch the latter is the purpose of the fixer, which is as indispensable to the operation as the gutter, and sink-hole, and scuppetting, already insisted on. Now there are many kinds of fixers: oil of vitriol, green vitriol, blue vitriol, salt and lime, (not however either salt or lime by themselves *on any account*), gypsum and other substances may be used when they can be had cheap; but some of them at all times, and in some cases all of them, have the fault of costing money. A substitute for them, *which costs nothing* except labour, is therefore to be sought for. Such substitutes exist in cinder-siftings, charcoal-dust, good black earth, peat or bog-mould, rotten saw-dust, leaf-mould, the black mud from the bottoms of ditches and ponds, the small fragments of wood from the bottoms of wood-stacks, soot, the brick-dust of brick-fields, or the powder of burnt clay. Some or all of these materials may be had in most places.

Such we believe to be practically the best way of preparing a dunghill, so as to save everything that is saveable. It is essentially the same as the method followed in Alsace, of which an account has been given

in our volume for 1842, p. 191. It must be obvious that no harm at least can arise from following our recommendations, which are to be carried out by a *saving* of both material and money. Supposing the plan does not answer, it will have put the person who tries it to no other charge than a little labour; and to so little, even of that, as to be of no moment in either garden or farm. The manure-heap must be made, at all events, and a boy will form the gutters and sink-hole, and keep the heap well moistened while the substance is in preparation.—*Gardeners' Chronicle*.

ON THE CHANGE OF CROPS AND SEED.

By CUTHBERT W. JOHNSON, Esq., F.R.S.

It would, perhaps, be difficult to prove more clearly the great advantages of change of crops, change of seed, and other modern agricultural improvements, than by instancing the difficulty with which, two centuries since, the farmers of England produced food sufficient for the then scanty population of our island, and yet that the farmers of our days, with a population of treble the amount, can, under ordinary circumstances, still as nearly support this enormously increased population, as the cultivators of the reign of Elizabeth; when, owing to bad tillage, the land yielded wretched crops of all kinds, and supported an equally miserable live stock. In fact, two quarters of wheat per acre were then deemed on many soils a fair crop; and if the cattle had "good large bones," we find from an old chronicler they were then pretty certain of being highly applauded by the graziers of that age. And this, too, was an advanced period of English agriculture; for, towards the close of the thirteenth century, an ancient author in estimating the profits of a farmer, calculated that if his land did not produce *three times* the seed sown, he would be a loser, without, indeed corn was unusually dear (*Fleta*, lib. xi, c. 82, s. 3)*. And that this estimate made by *Fleta*

* The prices then paid per acre will amuse a modern farmer (*Callam's History of Hawkstead*, c. 41). They are stated by our author to have been—for

Three ploughings	1s. 6d.
Harrowing	0 1
Two bushels of seed	1 0
Weeding	0 0½
Reaping	0 5
Carrying	0 1
	3 1½

of the produce of the farms of the 14th century, was not far from the truth, is proved, amongst other things, by the returns in 1387 of the produce of the manor farm of Hawkstead, in Suffolk, and of that of the manor of Dorking, in Surrey (*Brit. Husb.*, v. 1, p. 19). Hawkstead farm in that year produced from—

	Qrs.	Bush.
66 acres of wheat	69	2
26 ——— barley	52	2
62 ——— oats	40	4
25 ——— peas	25	3

The Dorking farm produced from—

	Qrs.	Bush.
30 acres of barley	41	4
28 ——— oats	38	4
5½ ——— tares	1	6

After such a review of their agricultural skill, we need not doubt the truth of Harrison's description of them, (he wrote in 1577) when he says—"they were scarce able to live and paie their rents at those daies, without selling of a cow, or a horse, or more, although they paid but foure pounds at the uttermost by the yeare. Such also was their povertie, that if some one od farmer had been at the ale-house (a thing greatly used in their daies) amongst six or seven of his neighbours, and there, in a braverie, to show what store he had, didst cast downe his pursse, and therein a noble, or six shillings, unto them, it was uerie likely that all the rest could not laie down so much against it." But when Harrison congratulated his contemporaries on the progress of riches and comfort amongst the farmers, he did not applaud without some discrimination, for it seems his contemporaries had begun to build their houses with oak, instead of willow; an improvement which he by no means felt inclined to applaud, for he remarks in another place—"when our houses were of willow, then had we ashen men; but now that our houses are come to be made of oak, our men are not only become wilowe, but a great manie altogether of strawe, which is a sore alteration."

The question of the rotation of crops is one of very considerable importance to the farmer; and, in proceeding with the investigation, it will be of primary importance to learn *why* it is that the farmer finds an alternation or change in the rotation of his crops so essential to the profitable cultivation of the farm; the *cause* of the change of crop being so conducive to the increased productiveness of the land; of plants deteriorating if grown for successive years in the same soil; and of their almost uniform improvement in luxuriance by continual removal to fresh ground; and I shall, therefore, in this paper, to a great extent,

repeat and enlarge upon what I have on this head already, in a previous volume of this work, remarked. In these investigations it is the chemical phenomena that have chiefly aided the cultivator in his enquiries. Thus many laborious chemical examinations have led to the production of two modes of explaining the difficulties noticed by all those who have been engaged for a series of years in the cultivation of the soil, and who have attempted to do this without any alteration of its crop.

By those who adopt one mode of explanation, it is held that, as each growing plant deposits in the soil peculiar excretory matters—matters, moreover, which are found to be particularly noxious to plants of its own species—that, in consequence, until these excretions are gradually decomposed by undergoing putrefaction, or removed by becoming the food of other plants, the same crop in that soil cannot be advantageously cultivated. And this doctrine is supported by the results of many experiments; not only by such men as Priestley, De Candolle and Macaire, but by facts which are very commonly known; for most growers of bulbs, and other roots often cultivated in water-vases, are aware of the advantages derived from changing the water by which they are nourished. Most persons, indeed, also know that such water soon becomes surcharged by the vegetable matters exuded from the roots of the plant; and that, if the water is not changed, its growth is materially retarded, and its healthy appearance speedily declines. And yet such impure water, it is well known, if applied to the roots of plants of another species, is far more grateful to them than plain clear water. And, moreover, in support of the same view of the case, certain plants, particular trees, are well understood to be excellent, and mutually fertilizing neighbours—a fact not of modern discovery; for the farmers of Italy, many centuries since, were accustomed to plant the elm as the companion, or husband, as they called it, of the vine; it has even been contended that hence first came from Italy (as the nourisher of the vine) this valuable timber tree into England.

And, again, every farmer is fully aware, amongst several other facts of a similar nature, that the corn-flower (*Centaurea cyanus*) can only be found in his corn crops—it is useless to search for it elsewhere. The gardener, too, adds his testimony of similar observations. He finds that it is almost useless, when replanting orchards, to place a tree where one of the same kind has grown before; and that on the site of an old quick hedge, young plants of quick vegetate with a reluctance that even copious dressings of manure can, in either instance, hardly overcome; and yet *other crops* on such sites grow without any fertil-

izing addition with remarkable luxuriance. The potato growers, too, near London, are well aware of the correctness of such remarks. There is, I think, some importance to be attributed to this mode of accounting for the facts of the case ; but still there are certain observations which do not well accord with this mode of explanation. There are some soils, for instance, which would appear (if the excretions of plants were the sole cause of the phenomena) to defy all the excretory powers of the plant. Thus, some of the newly cultivated lands of the United States of America have produced excellent crops of wheat for a series of years, without any sensible decrease in their produce. And there are certain soils in this country which are so happily constituted, that they seem to neither require a change of crop, nor any addition of manure. There are many soils, for instance, in the lower portion of the valley of the Thames, where wheat and beans have for an age been grown alternately ; and there is, I am told on pretty good authority, a field of about eighty acres at Littlehampton, in Sussex, which has been sown with wheat, and wheat only, for the last half-century, still producing four or five quarters per acre. It is fallowed and dressed every third year. Many planters of forest trees place each species of tree in plots by itself ; as they believe, from careful observations, that by thus being placed together, their growth is accelerated—a conclusion totally at variance with the belief in the production of a peculiar (to the same tree) noxious deposit in the soil.

Another mode of explaining the cause of the reluctance with which a crop follows in succession another of the same description, supposes that each kind of plant has some peculiar and essential constituent, which it absorbs from, and of which it materially exhausts the soil ; and that it is, therefore, only after the lapse of some time, when that or those constituents are restored to the exhausted soil by the addition of manure or other means, that the same crop can be again profitably produced.

To a considerable degree this theory seems not only a very plausible, but a very probable and reasonable explanation of the difficulty ; for most farmers are aware that some soils, which in former periods produced red clover in sufficient abundance every four years, can now only be made to yield remunerative crops once in eight or once in twelve years. The excretory powers of the plant, therefore, are in this case useless in explanation of the fact ; for, according to that mode of explaining the difficulty, the excretory matters which, in former periods were sufficiently decomposed or absorbed by the succeeding crops in four years, would exhibit precisely the same results in our age. But,

on the contrary, if we find, what has been often ascertained to be the fact, that such soils which now refuse to produce good crops of clover are at last totally deprived of sulphate of lime; and when we find that an average crop of clover removes from the land from one to two hundred pounds weight of this salt per acre; and that, moreover, by dressing the thus exhausted land with the very same weight per acre of gypsum (nearly pure sulphate of lime) that then the land will again produce red clover as well, and as often, as before, the probable conclusion to which we may arrive is, perhaps, apparent—viz., that the clover had gradually, although almost insensibly, deprived the land of an essential ingredient of this grass, which, when again restored, rendered it capable of supporting the same crop which in a former period grew upon it so well.

Many other facts seem to confirm this view of the difficulty. Thus, several plants are known to flourish best on peculiar soils—the oak tenants to the greatest advantage the clay—the beech, the chalk formations. The proportion of the earths in the fir tree (*pinus abies*), and in one or two other plants, has been found to increase with the proportion of the same earths contained in the soil. For instance, when vegetating on a soil containing only 1·74 per cent of carbonate of lime, the tree yielded 46 per cent of that salt; but, on a soil which contained 98 cent, the fir was found to contain 63 per cent. And, again, when silica was absent from the soil, it was entirely absent from the plant; but, when the soil abounded in that substance, then the fir contained of it 13·5 per cent. Some vegetables need peculiar saline food. Marine plants will not flourish without common salt is present in the soil. Saltpetre promotes very materially the growth of the nettle and the sunflower. The phosphate of lime (or earthy salt of bones) is essential to the perfect growth of several crops: it abounds in many of the plants with which our fields are covered, and, in some combination or other, is found in all cultivated soils.

The farmer, too, is well aware of other facts which appear to support this theory. To give an instance, the cultivator well knows, that, by cutting his crops when in their green state, his land is much less exhausted than when the plants are allowed to ripen their seeds. Now if it can be shown that the ripe plant contains a larger proportion of some essential earthy or saline ingredient than it does when it is growing, this would seem to tend to establish the truth of the last-named theory—viz., that it is by the plant abstracting something from the soil that thus renders it incapable of immediately producing the same crop. And certainly in some instances this appears to be the case, and it would

be well if these comparative analyzations were extended to other crops. For instance, it has been found by the most accurate experiments that the ashes of the entire plants of peas (*pisum sativum*), when *green*, contain only 17.25 per cent of phosphate of lime; but that, when *ripe*, they yield 22 per cent. And, again, that the ashes of the vetch (*vicia faba*) which yielded only 13.5 per cent of the same salt when the vetch is *in flower*, contain 17.75 per cent when obtained from a *ripe* plant. A similar result was obtained from other vegetables. The ashes of the *Solydago vulgaris*, for instance, which yielded 8.5 per cent of phosphate of lime when the plant was just coming into flower, contained 11 per cent when ripe. Those from the turnsole (*Helianthus annuus*), which afforded only 6 per cent when obtained from the flowering plant, contained 22.5 per cent when the plant was ripe. The ashes of the wheat plant, which held 10.75 when the wheat was in flower, yielded 11.75 per cent at harvest time. The ashes of some wheat *straw* contained only 6.2 per cent of phosphate of lime; but the seeds which it supported held 44.5, and the bran of these 46.5 per cent. The ashes of the oat plant, examined by M. Vauquelin, yielded similar results, the *ripe seeds* affording 39.3 per cent of this salt; but when the plant, seed and stalk were burned together, then the ashes only yielded 15 per cent.

It is probable also that the soluble matters derived from the decomposing organic substances of the soil, required for the food of plants, differ in their rapidity of production or fineness of division, in a manner of which at present we are not well acquainted; and that different plants also need a supply of these with varying degrees of rapidity. Every farmer is aware that some soils which are "too poor" or "too rich," that is, contain too much, or too little, or too slowly decomposing organic matters for the healthy food, or the profitable cultivation of one crop, are admirably adapted for the growth of another.

The evidence, therefore, in favour of the absorbent theory, or mode of accounting for the advantages derived by a judicious rotation of crops, appears rather stronger than that in support of the excretory mode of explaining the phenomena. It was this theory that the late Dr. Wollaston adopted to account for the formation, by a peculiar fungus, of "fairy rings." Davy inclined to the same mode of explanation, as did George Sinclair. Liebig supports the same doctrine. Yet it is more than probable that *both* causes may contribute to produce the effects of a repetition of crops. Changes of all kinds, however, let the true explanation be what it may, it is certain, appear to be ever grateful to vegetation of crop, of seed, of manure, and even, we shall presently see, of climate.

The *degree* in which different crops exhaust the soil has been examined and stated in figures under two points of view, first, as regards *the weight* of the crop per acre ; which will be found to be—under that mode of examination—if mangel wurzel is taken as 25, then the cabbage will be 25, white turnip 16, potatoes 15, khol-rabi 14, Swedish turnip 13, and the carrot 11. The other way of regarding the question is one whose results much more closely accord with the experience of the farmer. It is by taking the weight of nutritive matter which the crop affords per acre ; and then the degree of exhaustion produced will be found to be—potato 63, cabbages 42, mangel wurzel 28, carrots 24, khol-rabi 17, Swedish turnip 16, and the common turnip 14.

The practical application of these scientific truths to the improvement of the rotation of crops must, of necessity, vary with the peculiar situation in which the young farmer is placed. Many circumstances must be taken into his consideration : not only must he remember that some kind of crops exhaust the land more than others, but that some exhausting crops, owing to their being consumed on the farm (though they are considerable exhausters) restore to it, during their consumption by live stock, as much as, during their growth, they drew from its soil. Then, again, some crops, by admitting of the operation of the horse-hoe and other modes of cleansing the land, afford considerable facilities for the extirpation of weeds. Even in the operations of the garden the rotation of crops may be much more advantageously followed than at present. A question which the gardener, furnished as he very commonly is with an abundance of manure, seldom deems of importance to either the health or the productiveness of his crops. Plants extend, for instance, their roots to different depths and different directions in search of food. Those with deep roots, therefore, should be succeeded by such as penetrate not far from the surface. Annuals and perennials should succeed each other. Those which are consumed in their green state should be interposed between those which are cultivated for their seeds.

Of those which are grown chiefly for their seeds, the cereal grasses, such as wheat, oats, barley, and, pretty commonly, rye, are great exhausters of the soil. They not only are allowed to ripen their seeds, but the produce of these is carried off the land.

The common leguminous plants are also considerable impoverishers of the soil. These are chiefly the bean and the pea. They, too, are allowed to ripen their seeds, and these, like those of the cereal grasses, are carried from the farm. They are, in fact, almost as considerable exhausters of the land as the former ; but they are commonly drilled at

wide intervals, and admit of the land being cleansed better than the former crops allow. Their broad leaves, too, furnish a greater degree of shade to the land; and, when these are partially shed, a slight dressing is thus afforded to the soil. The influence of shade upon the land is greater than is usually supposed. A friend of mine had occasion to notice a remarkable effect of this in the case of a barn door, which had rested for some months on a fallow field. The crops which in succeeding years grew upon the square spot on which this door rested, were as clearly marked as if the ground had been exclusively manured with some rich fertilizer. Is this effect to be attributed to the inferior temperature of the shaded soil retarding the decomposition of the organic matters of the soil? Is a portion of saltpetre generated in such dry shaded land? Or, may the effect be attributed to both these causes?

If the cereal and leguminous crops materially exhaust the land, to a still greater extent do those crops which are cultivated for their stems, such as hemp and flax, produce this effect? for with these nothing is returned to the farm-yard. The turnip, cole, and other oily seeds, whose stems are usually afterwards burnt upon the land, are also equally exhausting to the soil. Hay crops, when carried off the farm, deteriorate it in a similar ratio. The crops which do not exhaust the land are those, such as the turnip, cabbage, vetch, &c., which are consumed by the live stock; either on the ground or by the soiling system. And those which *improve* the ground are such as are grown to be afterwards ploughed into the soil. Of these kinds are the buckwheat and the vetch, in England, and the lupine of Northern Italy: for here all that considerable portion of carbonaceous matter which the crop acquired from the atmosphere, or by the decomposition of water, is evidently so much added (when ploughed in) to the decomposing organic riches of the ground.

All these are facts which can hardly be too often remembered in the examination of the most profitable rotation of crops. For it is evidently upon this careful alternation of exhausting and less exhausting or enriching crops, that the advantages of a scientific succession of crops consist.

Change of crops possesses another very important advantage; and which I have never seen hitherto noticed so much as its importance deserves—viz., the checking of the increase, or the destruction of the insect vermin which prey upon the cultivator's crops. Thus, the parent of the wire-worm (the larva of a small beetle—the *Elatér segetis*) deposits its eggs in grass leys or other lands abounding with the cereal grasses; for a wonderful instinct teaches this little beetle to deposit its eggs where the young wire-worm will meet with its natural food, which

are these grasses. Change of crops, therefore, checks the deposit and continuance of such vermin, by depriving them of the particular food on which they subsist. And this advantage is not confined to the destruction of the wire-worm, the slug, and other predatory insects of a similar degree of importance, but it extends to a considerable number of more minute, yet still destructive insects. Perhaps the rapid increase within the present century of the wire-worm, may be partly ascribed to the more general omission of a pulse crop from the rotation of crops; and the increased growth of rye-grass, either mixed with or as a substitute for red clover.

By far the most common rotation of crops under which the light lands are cultivated, is either on the four course or shift system, or the five course or shift system. By this plan the land has a winter and summer fallow every four or five years, and a green crop is always interposed between two white crops. Thus the land, with the judicious assistance of the hoe, becomes neither foul or exhausted. The four-course system generally consists of—1, turnips, fed off; 2, oats or barley; 3, grass seeds; 4, wheat. The five-shift system which is in many situations a much more advantageous course of husbandry, is very common after a fallow—1, turnips; 2, oats or barley; 3, clover; 4, peas or beans; 5, wheat. A sixth-course system, on poor gravelly soils, or on land called "clover sick," is to substitute for the clover mixed grasses, which are kept in pasturage the second year. By this course we perhaps as much as possible accomplish the very desirable object in all rotations, of growing at as distant periods as possible crops of the same species.

For peat soils newly reclaimed and old woodlands, the best rotation is to commence with potatoes (and this is the best first crop for most newly enclosed lands), 2, peas; 3, turnips; 4, oats; 5, grass seeds; 6, peas; 7, wheat. In all poor fresh cultivated lands the attempt is generally made by far too soon to grow corn crops. This should never be done until some years have elapsed; for, if it is necessary to avoid in old lands (although long regularly manured at stated intervals) too rapid an exhaustion of their essential decomposing matters, to how much greater an extent does this necessity exist in soils, perhaps, long regularly deprived of every blade of grass as fast as it was produced, abounding in stagnant waters, and never dressed by any description of fertilizer?

Light lands present many facilities for the frequent succession of different crops (and from their poverty it is a fortunate circumstance that so). They are readily tilled in almost all weathers, and, when a green

crop needs removal, the operation is performed with little difficulty. From these, and other combined circumstances, the succession of crops on the lighter description of soils is much more varied in most well cultivated districts, than on the heavier lands. On these, green crops are cultivated, and drawn off the land with facility; and, in consequence, a sufficient supply of turnips and other winter food is provided for the winter consumption of a numerous live stock; whose manure, thus produced, readily maintains the continued fertility of the soil.

I will conclude with a few observations relative to the rotation of crops on heavy soils. The varied rotation of the crops of the heavy soils of England is an effort more difficult to effect, in many respects, than in those of the lighter formations; for the clays are not so well adapted to the growth of turnips or other winter food of live stock; and, in consequence, the facilities for altering the succession are very materially less. In many parts of our island the rotation on the clays is of the simplest description—wheat and beans in few instances being grown alternately in unvaried succession. Thus, on some favoured spots on some of the lands of the lower portion of the rich valley of the Thames, a fallow is never even deemed necessary. In other heavy soils the rotation is a six-shift course (and by letting the clover remain two years), as follows—1 year, summer fallow, dressed; 2, wheat; 3, clover or other grasses; 4, oats; 5, beans, manured; 6, barley or wheat. This last is a course which, on the more tenacious clays, has been found to be peculiarly advantageous. Then, again, it has been on some soils attempted, and not unsuccessfully, to partially banish summer fallows, by merely increasing the application of the horse-hoe and the scarifier. By the arrangement of the crops, which certainly affords considerable facilities for such an attempt, the rotation is, on a farm of 252 acres—turnips, 42 acres; barley or oats, with seeds, for two years, 42; grass, 84; peas on the layers, 21; beans ditto, 21; wheat after the beans and peas.

And, if the farmers of England have little difference of opinion on the question of the advantages derived from a rotation of crops, to nearly an equal extent are they agreed in the conclusion that change of seed is productive of the greatest advantages. Of the advantage, indeed, of a constant change of seed, and of procuring those seeds from soils situated in a climate differing from that in which they are intended to be sown, there is no doubt. The following remarks were made by the late Mr. Knight, who had seen the importance of the research, and long noticed some of the good results of the plan.

“The aggregate temperature of England,” he observes, “and of those parts of the Russian Empire that are under the same parallels of

latitude, probably do not differ very considerably ; but in the latter the summers are exceedingly hot and the winters intensely cold, and the changes of temperature between the different seasons are sudden and violent. In the spring great degrees of heat suddenly operate on plants which have long been exposed to intense cold, and the progress of vegetation is, in consequence, extremely rapid. In the climate of England the spring, on the contrary, advances with slow and irregular steps, and only very moderate and slowly increasing degrees of heat act on plants in which the powers of life have scarcely, in any period of the preceding winter, been totally inactive. The crab is a native of both countries, and has adapted alike its habits to both. The Siberian variety, introduced into the climate of England, retains its habits, expands its leaves, and blossoms on the first approach of spring, and vegetates strongly in the same temperature in which the native crab scarcely shows signs of life, and its fruit acquire a degree of maturity, even in the early part of an unfavourable season, which our native crab is rarely or never seen to attain."

" If two plants of the vine, or trees of similar habits, or even if obtained from cuttings of the same tree, were placed to vegetate during several successive seasons in very different climates: if the one were placed on the banks of the Rhine, and the other on those of the Nile, each would adapt its habits to the climate in which it was placed ; and if both were subsequently brought in early spring into a climate similar to that of Italy, the plant which had adapted its habits to a cold climate would instantly vegetate, whilst the other would remain perfectly torpid. Precisely the same thing occurs in the hothouses of this country, where a plant accustomed to the temperature of the open air will vegetate strongly in December, whilst another plant of the same species, and sprung from a cutting off the same original stock, but habituated to the temperature of a stove, remains apparently lifeless. Similar causes are productive of effects on the habits of cultivated annual plants ; but these appear most readily to acquire habits of maturity in warm climates, for it is in the power of the cultivator to commit his seeds to the earth at any season, and the progress of the plant towards maturity will be the most rapid where the climate and soil are the most warm. Thus, the barley grown on sandy soils in the warmest parts of England is always found by the Scotch farmer, when introduced into his country, to ripen on his cold hills earlier than his crops of the same kind do, when he uses the seeds of plants which have passed through several successive generations in his colder climate ; and, in my own experience I have found that the crops of wheat on some very high and cold ground which I cultivate, ripen much earlier when I obtain my seed-corn from a

very warm district and gravelly soil, which lies a few miles distant, than when I employ the seeds of the vicinity.”—(*Selection*, p. 174.)

It is by a steady observance of the rules which such scientific enquiries, combined with practical observations, point out, that the noble object of combining “science with practice,” can be rationally promoted. It is idle to attempt to lay down other than general rules and directions for a succession of crops which shall comprehend the chief objects of a farmer—viz., “the largest profit, and the most improving condition of the soil.” The varying circumstances under which the practical farmer is placed, as regards the composition of his soil—situation with regard to markets—supplies of manure—and several other important circumstances, are so endless, that the tiller of the land can alone in the best manner apply those scientific facts which the chemist’s labours have produced. The philosopher’s valuable labours, therefore, as regards the rotation of crops, can only be rendered practically useful by the good sense of the cultivator. And to him there is abundant reason for patient examination of everything that science can suggest on a theme so nationally important as this. The most careless will hardly deny that such is the case, and that the history of agriculture demonstrates that a steady progress has for ages been taking place in the produce of the land, through improved rotations of crops, and the results of other agricultural scientific efforts. No one will doubt who remembers what I have already alluded to, that, in the early part of the thirteenth century, three times the produce of the seed-wheat was thought to be a tolerable crop. And, even towards the end of the fourteenth century, two quarters per acre of barley, on a good Suffolk farm, were deemed a very fair produce. The cause of such a wretched produce is not difficult to discern. The farmers of those days were poor, indolent, and uneducated, and content to practise the same routine that had been handed down to them by their forefathers. They, as a matter of course, ridiculed all improvement, and even when, only a century since, the great Jethro Tull had the courage and the good sense to publicly propose great improvements in agricultural machinery and in tillage, he was regarded as a restless visionary, and opposed in every possible way. He, unfortunately for himself, lived a century too soon; for, by the enlightened farmers of our age, he would have met with a reception worthy of his merits and of the great cultivators who now fortunately tenant these islands.

14, GRAY’S INN SQUARE,
April, 1843.

ROUSE'S IMPROVED PLOUGH.

Mr. Henry Wilson, of Stowlangtoft, near Ixworth, Suffolk, on the 10th of May last presented to the Council of the Royal Agricultural Society of England a model of an improved plough.

The plough is the invention of William Rouse, a wheelwright, residing at Bury St. Edmunds, and the principal points of advantage ascribed to it, as communicated by Mr. Wilson, are the following:—That the share may be deepened or *fleetened*, to or from the land, without stopping the horses, or the ploughman's hand being taken off the plough; that it will go with or without a ground, with or without wheels, with a wood breast for turnip and summer land, and with any shaped iron breast that may be required or preferred; that it requires no sledge for its removal from place to place; that the coulter may be shifted six ways, by a movement effected in an instant, and so firm that no horse can move it; that the furrow can be taken any width or depth, up hill with equal facility; that it will be less expensive to the farmer and more easy to the labourer than any other plough yet made, the whole construction being so simple as to be kept in repair at less cost than other ploughs.

This plough has received the approbation of Mr. Allan Ransome, and has been tested by practical trials on various kinds of land in Suffolk.

THIRD ANNUAL REPORT OF THE STOKE FERRY FARMERS' CLUB.

In preparing their accustomed report of the proceedings of the club during the past year, your committee have had in the outset to encounter the difficulty but too frequently complained of in other societies of a like nature,—the paucity of materials.

But, although from various causes, the attendance of members has certainly not been altogether so regular in the past as in the two former years, yet on a careful examination into the subject, they are fully disposed to regard the omissions rather as accidental than as indicative of any material falling off in the interest hitherto manifested in the proceedings of the society. Into the circumstances that may have led to this apparent indifference, they do not feel themselves called upon to enter on the present occasion; suffice it to say, that your committee

have every reason for believing that the evil complained of has been, as they state, more apparent than real ; an opinion which they have little doubt will be amply confirmed by the amended results of the meetings during the ensuing year.

True, it may be, and has been argued by some, that as a farmers' club increases in years, it must, in the nature of things, to a certain extent at least, decrease in interest. Subjects which had the charm of novelty in the early stages of its existence, are now either wholly or partially exhausted ; and hence it becomes a matter of some difficulty to provide the requisite materials for discussion. Nay, there are not wanting those who maintain that this very apparent decline is a proof of success ; rather an Irish mode of deduction perhaps, but nevertheless to a certain extent correct ; for the usual topics having been exhausted, so far the institution may be said to have done its work ; and then follows the argument not unfrequently resorted to in such cases, " We would attend if there was any thing *new* to be learned at your meetings ; but, knowing already the chief points connected with practical farming, we see no use in going over the same ground again and again." Now setting aside the improbability of farmers in general becoming too knowing, it may not unreasonably be asked, how is it that in the same district there should exist such a marvellous diversity of management ? If all know equally well the best system of husbandry, why do not all practice it alike ? Yet so far is this from being the case, that probably no two farms, however similar in quality, situation, and so forth, are cultivated on precisely the same principle—one is stocked with sheep, the other with cattle ; one is manured highly with rape-cake or some such artificial manure, the other is wholly independent of any thing of the kind, and owes its condition, such as it is, entirely to the produce of the yards and homestall. One farmer ploughs but once for barley, his neighbour twice, or probably three times ; in short no two operations are conducted exactly alike. Such being the case even in the best cultivated districts, surely there must be something *to learn* before these apparent discrepancies can be reconciled, for it is obvious they cannot all be right. If however such is the existing state of things as connected with the general routine of farm management, and so great the ignorance of practical men of what is doing immediately around them, how much wider a field for observation and research is laid open by the progress of modern discoveries in agricultural chemistry, mechanics, and natural history !

Not a year passes without some new manure, some improved implement, or variety of grain being ushered into public notice, the con-

sideration and development of which, is the peculiar province of farmers' clubs; and it requires no small share of intelligence and research to keep pace with the march of modern improvement. Let it not be said, therefore, that there is no inducement to support farmers' clubs for lack of novelty. The science of farming is never thoroughly acquired, and the oldest farmer living will acknowledge that a long life is insufficient to do more than show him how little he actually does know. The truth of these remarks is fully manifested by the fact, that the attendance on these institutions is not confined to the young and inexperienced, but extends to many of riper years; who, if age could confer knowledge, would certainly stand in no need of such a medium of acquiring it; yet they not only do attend, but are frequently among the most active and useful of the members, benefiting themselves, but far more so the younger branches of the society, with whom their experience has, as it ought to have, great weight and influence.

Your committee have thought it their duty to offer these hasty remarks on the subject of farmers' clubs, and the obligation of all connected with the soil to support them; because it is their earnest wish to expose the fallacy of the opinion, wherever and by whomsoever entertained, that having done much, no more remains for them to do; a great deal is yet to be done, and through the instrumentality of these clubs, a great deal will be done, provided the members be true to themselves, and individually as well as collectively direct their utmost exertions to advance the great cause of practical improvement.

At the anniversary meeting in May, 1842, Mr. Etheridge was re-elected President, Mr. Taylor, Vice President, and Mr. Pigott, Secretary, for the ensuing year. The committee was also re-appointed, and the accounts having been submitted to the inspection of the meeting, the members dined together as usual, J. B. S. Bradfield, Esq., in the chair; when various matters, both mental and corporeal, were warmly and zealously discussed, evincing in the most unequivocal manner that here at least there was no lack of interest.

June 24th.—In consequence of the unavoidable absence of the Vice President and Secretary, during a tour in South Wales, no regular discussion took place this evening, and the meeting was consequently adjourned to

July 22nd.—But the out-door occupations of members at this season were too important to admit of much time being devoted to in-door relaxations, even those bordering so nearly on business as the meetings of the farmers' club. The attendance was consequently thin; but though no subject was formally announced, much interesting conversa-

tion ensued, and particularly on the husbandry of the South of France; the meeting having been honoured by the presence of a gentleman from that country, an engineer of considerable eminence, and a relative of one of the members. The climate and soil of his neighbourhood (Marseilles) were described as being remarkably hot and dry; but he had been the means of bringing a copious stream of water into the town and its vicinity, and its effects for purposes of irrigation were truly marvellous, especially for lucern, the growth of which he said was rapid beyond anything that could be imagined; whilst all grass and other herbage not under the influence of this artificial moisture, were absolutely parched up. After all, it appears that however desirable a warm climate like that of the south of France may be for the production of certain fruits, as figs, grapes, &c., it is only a temperature like our own that is capable of bringing to perfection gooseberries, currants, strawberries, &c. So rapid is the progress to maturity of almost every vegetable production, that the very wheat becomes too hard and steely to grind without a certain portion of moisture to soften it.

The harvest having soon after set in, occupied, as might be expected, the undivided attention of farmers during its progress, and in short the interregnum seems to have extended to

Nov. 18th.—When an exhibition of winter roots took place, in conformity to annual custom, for which certain prizes were offered, partly from the funds of the club, and partly from sweepstakes entered into by the members. For mangel wurzel, or field-beet, the only competitors were Mr. Joy, of Northwold, and Mr. E. Oldfield, of Foulden. The prize was awarded to Mr. Joy, for his red beet, weighing $18\frac{1}{2}$ lbs., and yellow beet $15\frac{1}{2}$ lbs and $15\frac{1}{4}$ lbs, each.

Mr. Oldfield's red beet weighed from $13\frac{1}{4}$ lbs. to $14\frac{1}{2}$ lbs. each root, and his yellow variety $11\frac{1}{2}$ lbs. and 12 lbs. each. In the *quality* there did not appear to be much difference.

The exhibitors of turnips were, Mr. Oldfield, of Foulden, swedes and whiteloaf; Mr. William Steward, of Boughton, swedes; Mr. Crowe, of Wereham, whiteloaf; and Mr. James Blomfield, of Eastmore, certain specimens of white turnips, to show the efficacy of particular manures.

The prize was awarded to Mr. William Steward; and the white turnips exhibited by Mr. Crowe obtained great commendation from the judges.

Those shown by Mr. James Blomfield, though not intended to compete for the prize, were highly interesting, and deserve more than a mere passing notice, as tending to illustrate the effects of different manures, the cost of which is accurately given in the annexed list.

- No. 1. No manure, a small ordinary looking bulb, in size and quality resembling the stone turnip, but in reality of the same variety as the rest mentioned in this list.
- No. 2. Manured with 60 bushels of ashes per acre, at one penny per bushel—more than the cost better than no manure.
- No. 3. Eight cwt. of carbon, at 2s. 6d. and 30 bushels of ashes per acre—total expense £1 2s. 6d. per acre.
- No. 4. Ten loads of unfermented yard dung, at 4s. per load, £2 per acre.
- No. 5. Fourteen bushels of bone-dust, at 3s. per bushel, cost £2 2s. per acre. This was one of the best and firmest, though not the largest of the roots shown by Mr. Blomfield.
- No. 6. Ten loads of unfermented yard manure, at 4s. per load (£2), and carbon and ashes to the amount of £1 2s. 6d. per acre—total expense £3 2s. 6d. per acre.
- No. 7. Ten loads of manure from cake-fed beasts, which he reckoned worth 6s. per load (£3), with 40 bushels of ashes, (3s. 4d.) making a total of £3 3s. 4d. per acre.

In exhibiting these roots, Mr. Blomfield fully explained his reasons for making these experiments, and concluded by expressing his opinion very strongly in favour of No. 7, which, though costing the most, was by far the best both in weight and quality. In short he proved most clearly and satisfactorily that the value of the produce was in proportion to the outlay expended on it, always bearing in mind that this must be regulated by the laws of prudence and judgment; for though spending money will not always raise money, it cannot be denied that a judicious expenditure for manure is the water poured down the bore of a pump, without which it is all but hopeless to expect to bring any to the surface.

The thanks of the meeting were unanimously given to Mr. Blomfield, for his remarks, and also

To the exhibitors of the different roots, and

To the judges on the occasion.

Dec. 16th.—The first subject for discussion this evening was "On the advantage of dipping lambs, with a view to the destruction of lice, and the prevention of injury from the fly."

Which, having been briefly alluded to at the last meeting it was thought unnecessary to enter upon more at large on the present occasion. All sheep masters were fully impressed with the importance and utility of dipping their lambs at least *once*, and better still *twice* in the year; for which purpose the following receipt was recommended, as having been found eminently successful wherever it had been fairly and care-

fully applied. Boil 1 lb. of arsenic and 1 lb. of soft soap in 4 gallons of water for about an hour; to this add 1 lb. of kali preparata, 40 gallons more water, and it will be ready for use. A common tub will suffice to hold the mixture, on opposite sides of which are stationed two men, one at the head, the other at the feet of the animal, which is completely submerged in the liquor back downwards; great care being taken by the man at the head, that the eyes are kept perfectly closed, and in fact no part of the head suffered to go below the surface of the mixture. When the fleece is thoroughly saturated a third man or boy ought to be ready with a short piece of ladder or lye-tongs to slip under the animal (from side to side of the tub) on which it is laid to drain by the two operators, who turn it about and squeeze from the coat as much of the liquor as possible. It may be proper here to add that no person ought to venture on this work who has any scratch or cut on his hand or fingers; as the arsenic will not fail to cause great soreness where even it touches the flesh of the part so affected.

“On the culture of lucerne.”

A plant to which, observed the mover, it is difficult to do adequate justice; and the full benefit of which did not appear to him either so well understood or so often attained as might be expected with the experience we had had of it. The fact is, we are even yet in the dark as to the best and most profitable system of management; some sowing it broad-cast, others drilling—one *with* a crop, the other *without*. This preferring a thin seed, that a very thick one. Now and then both sowing and drilling are superseded by transplanting. In short every different grower seems to rejoice in his own peculiar mode of cultivation, of course each deeming his own the best. All however agree in the opinion, that, to insure a good crop, the land cannot be too clean or too full of condition.

The mover observed that his practice had been to sow rows, at 14-inch intervals, *without* a crop, for he reckoned the first cutting equal in value to a middling crop of barley. He instanced the case of a friend of his in this county, who mowed 2 tons an acre the first time, and 1 ton the second. This gentleman sowed a cast of brank with his lucerne; the broad leaf of which afforded shade to the land, and, as some thought, protection to the young plants from the attacks of the fly.

The *time* of sowing was usually in the spring, and not too early, or much injury would be likely to accrue from frosts. Nevertheless a practice was adverted to as having been tried with success in the neighbourhood, of sowing this plant in the middle of November; but if the frosts of spring were hazardous, how much more so, one would think,

would be those of winter ! However, a plant well rooted before winter might stand a severe frost better than would a weak young plant a comparatively slight frost in the spring. But the middle of November does appear too late in the season to enable it to obtain a good firm hold of the earth.

Transplantation had also its advocates, particularly for filling up gaps in the drills. To show the safety, if not the superiority of this plan, an instance was mentioned on the testimony of a member who witnessed it, of a rocky field near Liverpool ; the soil of which was so thin, that in order to obtain any thing like the requisite depth for such a plant as lucerne, it was obliged to be moulded up into ridges, as for drilling turnips on the Northumberland system, except that instead of 27 inches the rows of lucerne when finished stood generally at 3, and some 4 feet apart, a space, it must be admitted wider than on a good depth of soil would have been necessary, but was in reality far better covered than would have been imagined by any stranger to the habits and growth of this extraordinary plant ; certainly, at 3-feet intervals there seemed to be little or no waste of land, the plants nearly touching each other in the rows. A satisfactory proof, that if the soil be but in good heart, the luxuriance of the vegetation will amply compensate for the thinness of the stems. A striking instance of the correctness of this theory may be adduced in the case of Scotch firs—when allowed space enough they become forest trees. Plant them in rows at 9 inches or a foot apart, they form a good fence, but nothing more ; they do not become trees because they are not allowed to grow large enough. They are stinted into bushes. Just so with lucerne—40 lbs. an acre of seed will produce what is called an excellent plant ; but what is it ? A thick mass of wiry stalks. When these become thinned, either by artificial means or the progress of natural decay, it is then, and not till then seen what the lucerne is capable of ; and it is a curious fact that the thinner the plant (provided always the land be kept in good heart) the more vigorous it becomes, and the greater will be the produce.

The next subject was “ The most beneficial way of employing farm labourers.” In introducing which, the mover after dwelling a while on the importance of the question, said that his object was not so much to propose, as to learn, the best plan of providing the labourer with profitable employment.

Since the enactment of the New Poor Law, it was manifestly the interest of farmers to employ their labouring poor, rather than force them into the house. A man could not be maintained there for less than 3s. a week ; and a family consisting of a man, his wife, and three children,

for less than 15s. a week. How much better on every account to take such a person out of the house, and give him 10s. a week for profitable labour! He was aware that it was too much the practice with some farmers in times of depression, and especially during the short days, to turn off all the hands they can, under the mistaken notion of saving themselves so much in the article of labour. But this was a pitiful species of economy, and very short-sighted withal, for he laid it down as a maxim that a man's wages were always earned. The increased produce from his labour would in almost any case repay a judicious outlay in wages.

He ridiculed the idea of a surplus population; and still more the remedy, by emigration. It was bad in principle; for under it we parted with our best men to benefit foreigners. It was the duty of landowners to do all they could to assist the farmers in the employment of labour; for instance, in the article of land draining, he had himself that very day, offered to pay all the expenses of draining, if his landlord would but find tiles; and his men would have earned a reasonable rate of wages too.

He deprecated the idea of any saving of rates under the new system; true, he had saved in rates £30, but he had expended £40 in labour, and his produce had increased in proportion.

He concluded by impressing strongly on the meeting, the policy of enforcing the principle of employment over that of creating a surplus of hands to be maintained in idleness.

A member connected with trade, remarked, that wherever the labourers were employed, they contrived to pay their way at the shop, but when thrown out of work, were sure to get into debt.

Other speakers agreed with the mover, that all labourers might, and ought to be, profitably employed; and contended that it was for the ultimate interest of all parties not to stand out, but to employ their full quota of men. Nothing, it was urged, was more injurious, either in a moral or pecuniary point of view, than a number of idle, unemployed people in a parish.

The argument that there was no surplus population, was attempted to be refuted. Contrary to the opinion which had been expressed in favour of this doctrine, it was endeavoured to prove that the labourers as a class, had increased, and were still increasing. The root of the evil was considered by some, to be the uniform rate of wages now paid for farm labour. According to this system, no encouragement was given to the good man over the bad. The law of settlement, too, was thought to be at the bottom of much of the mischief; this abolished, good and

efficient hands would find their value in the labour market; for it was well known that some were cheap at 2s. 6d., others dear at 1s. 6d. a day. From the circumstance of so many being unemployed, habits of idleness were acquired, very difficult to overcome; one proof was adduced, which could not but startle the serious observer, viz., that many lads were unable to plough, simply from preferring idleness to work in any form. It was not denied that there was great difficulty in effecting an equitable arrangement of labour; but under the present state of things it was hardly to be wondered at, if farmers should find it their interest to shift the burden from their own shoulders.

In opposition to these opinions, it was contended that the law of settlement had little or nothing to do with the existing state of the labour market; on the contrary, that the law in its present form was conducive to the happiness of the labouring classes, and the general welfare of the community.

After a few observations *pro* and *con* from other parties, it was unanimously resolved, that the principle be recommended for general adoption of apportioning the labourers to the assessment of the different occupations, say one for each £50, or some such scale.

The president here read a letter from the secretary, Mr. Pigott, regretting that circumstances had occurred which would prevent him from attending at their future meetings in that place, and in consequence resigning his office of secretary; at the same time expressing his readiness at all times to co-operate with the members in any other way to promote the interests of the club.

The existence of any obstacle which went to deprive the club of the valuable services of so active an officer, was deeply regretted; and hopes were entertained that the cause of his secession might eventually be removed.

Meantime Mr. T. Pooley begged to move a vote of thanks to Mr. Pigott, embodying the sentiments which had been expressed, which having been seconded by Mr. J. D. Etheridge, passed unanimously.

Mr. Taylor, whilst in common with all of them, he deeply regretted the occurrence which had led to this result, offered, in the absence, he hoped but the temporary absence of his friend, their excellent secretary, to supply his place at the meetings; an offer which was suitably acknowledged and accepted by the meeting.

Jan. 20th, 1843.—In the absence, through indisposition, of the president, Mr. James Blomfield officiated as chairman.

The first subject was "The destruction of rats." The remarks on which were rather of a desultory nature, than involving any specific

not being easily seen, were knocked off and ploughed in, to re-appear amongst the following wheat crop.

As to the preparation of seeds for market, there were various methods in use. His usual plan was to thresh by the flail with a view to freeing the seed from the *cob* or *kosh* (locally termed *drawing* the seed). For this he paid 6s. per bushel for clover, and 2s. 6d. for trefoil, *drawing* only. But this work was often done by machines, though great care was necessary to prevent them from breaking and otherwise injuring the seed in the process; many instances having occurred within his own knowledge, arising from an anxiety on the part both of the farmer and the machine-man, to leave as little seed as possible in the hull or *kosh*. However, instances were named of steam power having been applied to this work with great advantage and with perfect safety.

A member in the seed trade said, he spoke as a buyer—rib grass or plantain could not be got rid of by the merchant, but must be eradicated in the field by the farmer.

Various modes of *dressing* were described, one in particular, by means of a blowing machine recommended by the late Benjamin Holdich; which, though intended principally for corn, was found not less applicable to small seeds. It was by some maker in Yorkshire, but the name had been forgotten.*

March 17th.—The evening was principally occupied with a conversation, rather than a formal discussion, on the propriety of sowing wheat in the spring, or late in the winter, which, from some cause or other, had been left undone at the proper season. It was interesting as confirming the opinion held by many, of the impolicy of substituting wheat of any kind for barley, as a general practice. True, occasions might, and sometimes did arise, where wheat might not unfairly, nor perhaps improperly, be taken as a spring crop, but such instances were very rare, and only admissible under peculiar circumstances of soil and season.

Talavera was particularly alluded to, as, from its early maturity, partaking of the character both of spring and winter wheat; but considered as the former, it was objectionable (in common with all spring wheats)

* In connection with this subject, we beg to direct the attention of seed growers, farmers in general, and more especially the members of farmers' clubs, to a most useful and unpretending little work, entitled "An Essay on the Weeds of Agriculture," by this same Benjamin Holdich. It is but a sketch; which, had the author lived, would doubtless have received many additions, but as it is, it will be appreciated by all practical men, and no farmers' library ought to be without it. It is edited by the late George Sinclair; itself a powerful recommendation.

as inducing a too frequent repetition of wheat as a crop during a four-course shift; few soils would bear it oftener than once in four years. By substituting wheat for barley, you take it every other year. Whether owing to this circumstance or not, it had frequently disappointed the expectations of the farmer, being found extremely liable to disease, especially the red robin or red gum, the work of an insect known in Scotland by the name of the wheat fly (*Cecidomya tritici*). A member stated that he once drilled two fields with Talavera in place of barley, some way apart from each other, the land in both cases very clean and in good condition. To the casual observer, the crops warranted from 8 to 10 coombs (4 to 5 qrs.) per acre; it did not exceed 3 coombs an acre, and instead of plump sound grain, was very little better than pigs' or chickens' meat. If to this difference between a bad crop of wheat and a good crop of barley, we add the probable deficiency of the next wheat crop arising from its too frequent recurrence during the course, some idea may be formed of the mischief and impolicy of pursuing such a system. It may here be important to mention as a proof of the evil being attributable to spring sowing, a small quantity of this very Talavera wheat had been sown by mistake the preceding autumn on a clover stubble. It suffered from the weather, and was very thin of plant in the spring, but there was no red robin or any other disease; for the ears, though few in number, were well filled, and the grain plump and beautiful as possible. But putting aside altogether the *policy* of sowing winter wheat in the spring, the practice is attended we fear with too much risk to be generally recommended. Spring wheat, however inferior in quality for milling purposes, does look tolerably fair to the eye; and it must be admitted, from the rapidity of its growth and its lesser liability to disease, it is to be preferred to winter wheat for *spring sowing*.

A very prolific variety was mentioned as having been grown in the neighbourhood of Southery, but probably under peculiar circumstances as to soil, which would render its success on the general run of lands exceedingly doubtful.

April 7th.—"The best time for rolling barley."

In proposing this question, the main point to determine was, first, the safety of the barley crop, and next, to guard against any detriment by the operation of rolling, to the clover and other artificial grasses sown therewith.

It was admitted by all, that small seeds, roll when you will, are sure to be more or less injured by the process. If the surface be cloddy, the young tender plants will be crushed, and the layer must suffer in consequence; and if too fine, especially on light sands, the first windy day

will sweep away both soil and seeds. Then comes the question, what is the best way of guarding against two evils apparently of such opposite characters? and this involves another question, on which, in fact, the first hinges, what is the best time for sowing the small seeds?

Taking the last first, it was argued by some that the best plan was to defer sowing the seeds till after the barley had been ten days or so out of the ground; but this was opposed by the majority, who gave the preference to sowing immediately upon the first harrowing after the drill, rolling down and finishing off the field at once. Much, however, was to be said as to the nature of the land. Rolling of barley, it was contended, was alike injurious on very light and very heavy land, though from totally opposite causes. Reverting to the question of sowing, a modern invention was spoken of in high terms of commendation, for drilling in small seeds with coulter, as in the case of corn. The common sowing machines it is well known only drill broad-cast, as it were, in other words, distribute the seeds with great regularity on the surface; but the new machine deposits them at any given depth below the surface. On the whole, the opinion was generally in favour of rolling, where it could be accomplished with safety; and that not too long after the barley was sown.

The next subject was, "The best season for depositing artificial manure to the growing crops, particularly in reference to wheat."

A question, observed the proposer, of great importance, especially when the high price of artificial manure was taken into consideration. He fancied he had seen these manures applied in many cases too early. His own opinion was, that they could hardly be applied too late. Last year he had manured on the 23rd of April, and he was convinced with greater benefit to the crop than if earlier. He had, as an experiment, applied manure for wheat in autumn, but objected to the practice on account of the premature exhaustion of its enriching qualities, and from the belief that its effects would not continue through the season. He had been advised to sow some of the new manures at twice, but was ignorant of the advantages of the plan.

It was remarked, that however valuable experiments of this nature might be, they were for the most part conducted in too vague and imperfect a manner to be satisfactory. A member stated that he had by the advice of a friend sown 1 cwt. of saltpetre to the acre of wheat, at two applications; the first half about the middle of April, the second a month or so after. Undoubtedly, the wheat so treated had been considerably improved by the dressings, but to what extent the double, or rather the divided dressing did good, he confessed he was unable to

say. The only way to ascertain this would be to sow equal portions at one, and at two operations.

Much, observed another member, depended on the nature of the after season. He had tried the nitrate of soda in the beginning of March, but with little effect till after a considerable time. He did not think the present time (the beginning of April) too early to apply artificial manures; and here he must remind them that wheat remains longer green, and is slower in ripening, from nitrate of soda than from any other manure of the kind. He was fearful of sowing rape-cake on wheat in the spring, lest it might produce mildew; if applied at all, the earlier the better. He concluded by strongly advocating early spring sowing of manure. The practice of the late Lord Leicester (at that time Mr. Coke) was alluded to, who derived it, if we recollect right, from the late Mr. Overman, of Burnham. He preferred drilling in oil-cake (for at that time saltpetre, nitrate of soda, and other manures of the kind were unknown) between the 9-inch rows of wheat, in March, to depositing it with the seed in the preceding autumn; alleging, what probably was consistent with fact, that the fibres of the wheat felt for and soon found out the oil-cake, the benefit of which was proved to be greater to the crop than if the manure had been applied at an earlier period of its growth; but this of course implied a complete burying of the rape-cake beneath the surface, and not as was the case with some he had seen, drilling in the manure so fleet as barely to cover it, by which neglect in the event of a dry season it wasted away and became of little or no use; even in the event of moisture supervening, the manure would be far more efficacious if well and properly buried. Of course this observation applies chiefly to oil-cake and not to such manures as saltpetre or soda, which are quickly dissolved even by the action of the air, and easily find their way to the plants around them.

Such were the principal points touched upon; but it must be considered the discussion still leaves the main question undecided, viz., the most proper time for applying artificial manures, and how far it is advantageous or otherwise to divide the dressing, rather than sow the whole at once. This proves the necessity of further experiment, as well as the importance of the strictest attention to correctness in the detail of such experiments.

The diseases incident to ewes at lambing time having formed rather a prominent feature in the report of last year, it may appear strange that there should have been no formal renewal of the subject during the present year; but though no *public* discussion has arisen thereon, scarcely

a meeting has been held that conversational allusion has not been made to the general state of the flocks. A main reason for the silence which has prevailed on this point is the very gratifying fact of the almost general success of the lambing season of 1843, as compared with that of the preceding years. Instances of mortality both among ewes and lambs have undoubtedly occurred, but they constitute the exception, not the rule. Still so long as this mortality does prevail, whatever be its extent, it is imperative on all to endeavour to trace out the *cause*, with a view to the ultimate *removal* of the disease.

Nor ought the apparent discrepancies in the reports of different flocks at all to operate against this course of proceeding, but rather to serve as a stimulus to investigation. For why should one person go through the season with little or no loss of ewe or lamb, whilst his neighbour on the other side of the hedge sustains the loss of nearly a fourth of his breeding flock? Yet such facts do occur, and loudly do they call for investigation. They are mysteries which demand the attention of all connected with the management of sheep, and in an especial manner of such institutions as farmers' clubs. Meantime we are quite sure that the publication of the following letter from Dr. Rigby, who took so deep an interest in the subject last year, will be read with the attention it so well deserves, as forming a valuable addition to the information already afforded by the same intelligent practitioner. It is addressed to a member of this club.

"MY DEAR SIR,—Many thanks for your Second Report of the Stoke Ferry Farmers' Club. The disease among the ewes is now distinctly proved to be in the womb; and as far as I can see, from the post mortem examinations at p. 17, is very analogous to the malignant forms of puerperal fever among women. The cause of the straining still puzzles me. It probably depends on the inflamed state of the lower bowels, bringing on a painful urging to pass *fœces*, or *tenesmus* (the Scotch call it *kneeding*, or *needing*), as we see in dysentery, and similar inflammatory attacks of the lower bowels.

"No observation has been (as far as I remember) made as to the dampness of the ground where the ewe was, nor the character of the soil. I think that the free use of salt during the last month of pregnancy, and a large dose of calomel, followed in eight hours by castor oil, ought to be given the instant that any symptoms of the disease manifested itself.

"I would give twenty grains of calomel, with as much of Dover's powders, in a bolus. The animal should be put into a warm dry shed

orhouse, and have the wool clipped off the lower half of the abdomen, which part I would cover with a large mustard poultice. This should be made with *tepid* water, spread on a piece of old sacking and fixed by two girths.

"A stream of water at the temperature of 100° thrown up into the uterus would act very beneficially as an internal fomentation; and when the medicine had acted sufficiently, 70 or 80 drops of laudanum in a wine glass full and [a-half of warm barley-water, or thin gruel, might be thrown into the rectum, and would probably allay irritability after the calomel had had its full effect.

"The plentiful use of salt in these diseases is of great importance to animals as well as man. Why do animals traverse so many hundreds of miles to get at a salt lick? There is no doubt that we neglect this point very much with our domestic animals. Salt converts black venous blood into bright red arterial blood, and certainly in all malignant, putrid, or typhoid fevers is invaluable. * * *

"EDWARD RIGBY.

"1842, 10th June,
"23, New Street, Spring Garden."

One word in conclusion, on the mode of selecting subjects for discussion. In some clubs the choice has been left to a committee, by whom a list has been prepared and circulated among the members. This list contains a subject for each night of meeting; and if all discussions were of equal length, it might work well enough in practice; but when it is considered that one discussion may be too short, and another too long, to occupy any given space of time, it becomes a matter of doubt how far it is proper to adhere to the system, literally of speaking by the card.

Hitherto we have rather preferred making our selection of subjects from month to month; not one only, but never less than *two* and sometimes *three*. And if from accidental circumstances it may be considered expedient to introduce a subject not previously named, even to the exclusion of one or more of those that have, we see no great objection to it. The grand point is to make farmers' clubs *practically* useful; and the way to effect this is to adapt the discussions to the peculiar circumstances under which the farmer finds himself placed by season, fluctuation of climate, temperature, &c.; in other words, to make the discussion *seasonable*. Now this can hardly be done by any *set form* of arrangement; a certain latitude may not improperly be allowed in such matters; and we cannot help thinking that experience warrants the recommendation of it to farmers' clubs in general.

May, 1843.

SAMUEL TAYLOR, *Sec. pro tem.*

SCHEME OF A PROVISION FOR AGED LABOURERS.

SIR—It must be admitted that great and rapid strides have, of late years, been made in the power of creating wealth in this country ; but if it be asked, had the same progress been made in the science of distributing it, will it not be answered in the negative ? I call upon Sir Robert Peel as a Christian and a statesman, to get carried into practice a scheme for that end, that would benefit society, and which I think yields not in importance to the questions brought forward by Lord Ashley and Mr. Buller, for it appertains to the natural circumstances of men in this life. The scheme is, giving the working classes the opportunity of purchasing simple deferred annuities, to be paid them when they attain the age of sixty, which would enable them to provide for old age in a way they do not at present possess, by an exchange of equivalents, and without cost to the rich. It would be a standing lesson of forethought and prudential obligation ; besides, it would create interests of such magnitude, and develope views of political economy of such importance, that we should be able to reduce the number of our army and police, and it might be no feeble link in the social chain between this country and Ireland.

By the annexed comparative tables you will perceive that Lord Althorp's Savings' Bank scheme is a failure—it proposes to accomplish more than one assurance, which is fatal to its usefulness.

I am, Sir, your obedient servant,

CADOGAN WILLIAMS.

Table from returns to Parliament, Commons' Report Friendly Society, 1827, p. 113, showing the Single Payment necessary for assuring Four Shillings a-week, to commence at the Age of Sixty-five, to provide for Old Age.

Age of Admission.	Single Payment.
21	£6 1 4
22	6 7 4
23	6 14 0
24	7 4 0
25	7 7 4
26	7 15 0
27	8 2 8
28	8 11 0
29	9 0 0
30	9 9 0
31	9 19 0

FRANCIS BAILY.

London, June 18, 1838.

Government Savings' Bank Scheme to provide for Old Age.—Sums to be paid to secure Ten Pounds per Annum after the age of Sixty-five, which is less than Four Shillings a-week.

Age of Admission.	Single Payment.
21	£17 12 6
22	17 12 6
23	18 5 9
24	18 19 6
25	19 13 9
26	20 8 6
27	21 19 6
28	22 16 0
29	23 13 0
30	24 10 9
31	25 9 3

My connection with the Government Savings' Bank Annuity Scheme.

I believe my relations will be generally acknowledged to have had no inconsiderable influence on institutions in this country which mark the progress of society, and by which millions are held and beneficially distributed.

The Life Assurance Offices.

That it is probable I may have heard more of assurances and annuities than has fallen to the lot of every person. It occurred to me I perceived truths of some importance to society, and communicated them to persons of consideration, and received the countenance of the late Mr. Wilberforce, Mr. Ricardo, and others regarding them. On my representations and petition, Lord Milton called a committee of the House of Commons, and it was for me to make a case, which, of course, was as strong as I could; but, contrary to my wish and expectation, it put, I believe, the committee on a wrong train of thought, which, possibly, I might have been able to correct, but they, differently to what must be usual on such occasions, refused to let me be present in the committee-room; however, they obtained the evidence of several persons on the subject, had tables calculated, and reported I had called their attention to a subject of importance. After this, I came to London to urge the business being called into practice, and called at Lord Althorp's office; his lordship would not see me: the consequence was, I called on Sir Thomas Fremantle, one of the present Secretaries of the Treasury, who likewise had been on Lord Milton's committee, and, on my representation, took the business up, and gave notices in the House of Commons to bring in a bill for the sale of annuities through the savings' bank, which no sooner had he done, than Mr. Tidd Pratt called and acquainted him that the Chancellor of the Exchequer had a bill prepared on the same subject, which he had passed, for the sale of deferred annuities. Tables were calculated for the use of the savings' banks, and they were similar to those appended to the Parliamentary Report on my petition, and the business was eulogized in the pamphlet giving an account of the doings of the Reformed Parliament.

TESTIMONY.

Mr. Wilberforce wrote to me in 1819, to say the idea was a good one.

Mr. Ricardo wrote to me in 1821—"A plan for securing annuities to persons in the decline of life, by a small payment when young, would, I think, be wise and beneficial."

Lord Milton called a committee of the House of Commons on my petition, and reported that the object of their enquiries was one that, many years ago, had occupied the attention of some of the best and wisest men this country had ever known, alluding, I believe, to Mr. Dowdeswell, Mr. Burke, Sir George Saville, and Mr. Wedderburn.

"House of Commons, April 10, 1837.

"SIR,—I have had the honour of receiving your letter, which I will place in the hands of the committee; and if I receive any instructions from them to summon you, I will let you know. I am quite sensible of the importance of the subject to which you allude.

"I am, Sir, your obedient servant,

"J. N. FAZAKERLY."

"There can be no doubt the principle of your plan is very good."—*A noble Duke, and, I believe, a Chairman of a Poor-law Union.* 1839.

"The plan you propose would be highly beneficial to the poorer classes."—*A Chairman of a Poor-law Union.*

"I should be happy to see the project fairly afloat, and have much pleasure in assisting to pass the resolutions of the Board of Guardians, expressive of our approbation of it."—*A Chairman of a Poor-law Union, who now fills a high appointment in the Colonies.*

"Treasury Chambers, January 29, 1843.

"SIR,—I am commanded by the Lords Commissioners of Her Majesty's Treasury to acknowledge the receipt of your letter of the 19th inst., containing suggestions relating to finance, and to convey to you their thanks for your communication.

"I am, Sir, your obedient servant,

"G. CLERK."

"To Mr. Cadogan Williams."

"Salisbury Savings' Bank and Annuity Office,
January 21, 1843.

"SIR,—I am directed by the trustees and managers of this institution, to acknowledge the receipt of your letter, addressed to the actuary, on the subject of an alleged extraordinary error in the government tables for deferred annuities; and to inform you that your letter has been forwarded to Mr. Highams, who is, in their opinion, best calculated to bring the subject with effect before the Lords of the Treasury.

"I am, Sir, your obedient servant,

"R. M. WILSON, Asst. Secretary."

"Mr. Cadogan Williams."

CONCLUSION.

A deferred annuity scheme requires no subscribed capital to carry it into practice; no certificates of medical men; is not so open to imposition as life assurances are, for it mainly depends on natural results, and not on morals; and had we the calamity of a national pestilence, it might be trying to the resources of life assurances, but it would add to the wealth of the claimants of this scheme. The scheme would enable some parents to tell their children, "whatever happens, if you live to be old, you will not be obliged to spend the remainder of your days in the union poor-house."

Then it is not for the poor, but the working classes of all ranks, that depend for their living on the labour of their head or hands, for it is the way by which money can be most economised to lay up a provision for old age. And it admits of this adaptation: suppose a person has bought an annuity of three shillings a week, to be paid him when he attains the age of sixty, he may say, I am in health and work, and three shillings is little to retire upon; if I can do without it one year it will be more—if for five years it will be nearly double—if for five years more, nearly double again, and so in proportion. The amount of the annuity the person is entitled to may at any year be ascertained by calculation, and paid;—but no capital can be returned, without endangering the institution.

C. W.

 THE TUSSAC GRASS OF THE FALKLAND ISLANDS.

 From Dispatches of Lieut.-Governor Moody to Lord Stanley.

There is another indigenous grass of estimable value, which deserves the particular attention of every person connected with grazing and sheep-farming even in England, but more especially in Scotland and in Ireland. I allude to what is here called "tussac." The tussac is a gigantic sedgy grass, of the genus *Carex*. I measured the blades, and found them to average seven feet in length, and three quarters of an inch in width; some, in favourable situations, are longer, and if cultivated with care they would probably flourish still more vigorously. The plants grow in bunches close together, and as many as 250 roots spring from one bunch. In old plants the decayed roots of successive shoots form a cushion of dry entangled fibres, which raise the bunch from the ground. This cushion sometimes attains to a great

size and height, so that a person standing in a patch of old tussac may be quite sheltered and concealed. The cushion is dry and inflammable; and where the wild cattle and horses have completely destroyed the plants by eating down to the very roots inclusive, these lumpy accumulations of decayed fibres are left encumbering the ground with a multitude of hummocks, easily removed, however, by fire.

The grass growing in large tufts upon the high base of decayed roots resembles, at a distance, a diminutive grove of thickly-clustered palms; and from the dark green and luxuriant appearance given to the smaller islands clothed with tussac, the richness of tropical vegetation is forcibly recalled to the memory.

All the other species of the genus *Carex* are described in botanical works as coarse and rank, and by no means adapted for fodder, but it is very different indeed with this species. That it is sweet-flavoured, tender, and most nourishing, is evident from the avidity with which all animals feed, and the rapidity with which they fatten upon it—cattle, horses, sheep, and pigs alike. For about three or four inches the roots are very agreeable to man, being crisp, and of a sweetish nutty flavour, very much resembling the heart of the palm-tree in the West Indies, which is called the mountain cabbage.

There is an island close to the settlement which is fringed with the tussac grass for a breadth of about 200 to 300 yards, the remaining portion being wiry coarse grass and moss on wet land. Lean cattle turned upon this island become fat in two or three months; and the miserable old horses that return from the cattle-hunting expeditions dreadfully out of condition, soon pick up, and become quite fat upon the tussac which grows there.

The two Americans who wandered upon West Falkland for 14 months lived upon the root daily, and formed their huts of what I have termed the cushion, rolling one to the small doorway or opening when night came on.

The long blades of the grass make but an indifferent thatch, as it is much too brittle to last when dry: there are no fibres sufficiently tough or coarse for this purpose. I may notice that cattle and horses will readily eat dry tussac when they cannot procure it fresh; but an ample supply of it can always be obtained, as it is green and luxuriant all the year round.

The bounty of Providence causes this extremely nutritious grass to grow most luxuriantly in the rank peat-bogs by the sea-shore, where any other, even of the most inferior quality, could scarcely live. I may say that by far the greater part of the coasts of these islands are fringed

with it in many places to the breadth of half a mile: all the smaller islands are completely covered with it. It grows readily between clefts in the rocks, out of shingle and sand, close down to high-water mark; but it is most luxuriant where there is a depth of wet peaty bog. Whether it will grow upon boggy land further than half a mile from the sea, can only be determined by experiment. At the proper time I shall try it, and I entertain the most sanguine hopes that it will succeed, though perhaps it may not grow so luxuriantly as by the sea-shore.

If it should succeed upon inland bogs, such land could be made to yield as much nutriment for cattle as any other.

I am informed that a similar species of sedgy grass is to be found in the Straits of Magellan, the Auckland Islands, and many other places in the southern hemisphere; but, unlike its northern relations, the southern *Carex* appears everywhere to be tender, full of nutriment, and the favourite food with all cattle.

Extract from a later Report, dated October 1, 1842.

In my last report I noticed the extraordinary dryness of the atmosphere, produced chiefly by the constant winds of summer. During the past winter months of June, July, and August, the excess of dampness and moisture has been equally remarkable, unaccompanied, however, by rain, and, comparatively with England, there was but little snow. The ice has been sufficiently thick to bear the weight of a man twice, for two or three days together; and the thermometer has occasionally been as low as 25°, and once 18° during the night. The wind has been by no means so strong or frequent as in summer; and calm days, with sunshine, occurred very often—much more frequently than in England.

Upon the whole, the winter, though considered in this place as very severe, would have been thought a mild one in England. The dryness of the air is now again beginning to be apparent, and a fine summer is anticipated: already the thermometer has risen as high as 69°. My present opinion therefore is, that the winters in the Falklands may be considered very mild, but moist, though not rainy, and with little wind. The moisture does not arise from rain or fog, but from the nature of the ground, (a light soil upon a tenacious subsoil), numerous springs and rivulets, and the absence of the evaporating winds of summer.

The plant described as the tussac by Mr. Hooker, in the enclosure which I had the honour of forwarding with my report, is of the genus *Carex*, and proves not to be the real tussac of the islands—which it very much resembles, and might easily deceive any person, the more so as it grows in the same situations, and is also eaten by the cattle. My

friend Mr. Hooker has since given very great attention to this useful and interesting plant, which is a true grass, and in very much greater abundance than the other. As soon as I can collect some ripe seeds, I will also take the liberty of forwarding them; as perhaps your lordship may deem the grass worthy of a trial in England, both inland, as on Chat Moss, and on the sea-coast.

Some seeds of the tussac grass, sown in the government garden, in good soil, different from that in which it grows naturally, and at a little distance from the sea, have shot up, and are likely to prove that this valuable fodder for cattle may be cultivated in any soil; but it evidently prefers moisture, and would probably require irrigation in a dry soil at any distance from the sea.

During several long rides into the country I always, as I have before stated, found the tussac flourishing most vigorously on spots most exposed to the sea, and in soil unfit for anything else to live in, viz.—the rankest peat-bog, black or red. It is singular to observe the beaten footpaths of the wild cattle and horses, as marked as a footpath across the fields in England, extending for miles over wild moorland, and always terminating in some point or peninsula covered with this favourite fodder; and amidst which it is almost certain to meet with solitary old bulls, or perhaps a herd, or a troop of wild horses just trotting off, as they scent it from a great distance.

To cultivate the tussac, I would recommend that the seed be sown in patches, just below the surface of the ground, and at distances of about 2 feet apart, and afterwards weeded out, as it grows very luxuriantly, and to the height of 6 or 7 feet. It should not be grazed, but reaped or cut in bundles. If cut, it quickly shoots up; but is injured by grazing, particularly by pigs, who tear it up to get at the sweet nutty root. I do not know how it would be relished as hay; but cattle will eat the dry thatch off the roof of a house in winter. Their fondness for this food is so great that they will scent it at a great distance, and use every endeavour to get at it. Some bundles which were stacked in the yard at the back of the government-house were quickly found out, and the cattle from the village made repeated endeavours every night to get at them, giving much trouble to the sentry on duty to drive them away.

Extract from a Report of Mr. Hooker to Lieut.-Governor Moody.

“H.M.S. Erebus, Berkeley Sound, Falkland Islands,
5th September, 1842.

“I shall now, according to promise, lay before your Excellency a slight account of some of the more useful plants of this colony, especially

of such as appear to be at present, or may prove in time, of most use to man.

“The remarkable increase and fine condition of the cattle (comparatively speaking) recently introduced on the island naturally call the attention to the grasses in a country devoid of trees, or of any vegetable production likely to prove more important. Amongst these, which are very numerous, and form one-fifth of the plants hitherto discovered, the tussac holds the first place; as, however, you have a description of it, and know far more of its invaluable properties than I do, it would be useless to recapitulate here: suffice it to say, that with proper attention to its propagation in any locality near the coast, and preservation from being entirely eaten down where it already abounds, it alone would yield abundant pasturage for as many cattle as the island is ever likely to want.

“Another grass, however, far more abundant, and universally distributed over the whole country, scarcely yields in its nutritious qualities to the tussac; I mean the *Arundo alopecurus*, which covers every peat-bog with a dense and rich clothing of green in summer, and a pale yellow good hay in the winter season. This hay, though formed by nature without being mown and dried, keeps those cattle which have not access to the former grass in excellent condition—as the beef, which our parties for the four winter months supplied the ships with, can abundantly testify. No bog, however rank, seems too bad for this plant to luxuriate in; and, as we remarked during our survey of Port William, although the soil on the quartz districts was very unprolific in many good grasses which flourish on the clay-slate, and generally speaking of the worst description, still the *Arundo* did not appear to feel the change; nor did the cattle fail to eat down large tracts of such pasturage.

“The numerous troops of horses, also, on the flanks of the Wickham Heights, can have little other fodder; whilst those of Mount Lowe and Mount Vernet must depend upon it entirely. Should the tussac disappear from any part of the island where stall-fed cattle are kept, it might be advisable to treat this plant as hay is in Britain, by which means its nutritious properties would doubtless be much better secured to the animals during the winter months, than by allowing the leaves gradually to wither, and not gathering it until nature has dried them.

“For sheep, as hay, it would also do well; though I fear that it is of too wet a nature, and thrives best in situations far too damp for their succeeding on it all the year round. Experience only will prove this: at any rate newly imported flocks should not at once be removed from dry fodder to any so succulent.

“ You are aware that many English plants invariably follow man, undesignedly on his part ; many such are common here, as the groundsel, chickweed, and shepherd’s purse, docks, &c. ; and have been distributed chiefly through the agency of cattle, rabbits, fowls, and horses, more or less all over the island : amongst such, and most abundant of all, is the *Poa annua*, a very common English grass, and which forms a short bright green sward all the year round on the drier soil near the settlement, mixed with a few of the smaller native grasses and the common Dutch clover. Close to government-house there are many acres of such pasture ; the sheep seem very partial to it, and thrive uncommonly well : a little attention to its increase, especially by sowing it in similar situations, and draining the ground, might produce very beneficial results.”—*Jour. Roy. Agr. Soc. of England.*

[If on trial the Tussac Grass shall be found to flourish on the heaths and marshes of this country, some strange changes must naturally ensue. Heaths and bogs have often been considered as almost worthless ; as foul blots, marring the face of the country ; and, according to our system of agriculture, would have required a considerable outlay of capital to render them fit for the purposes of cropping ; now, however, it seems they may, at a trifling expense, be clad in the most intense verdure, which, besides being ornamental, will abundantly furnish the most nutritious and palatable food for the stock on the farm. The thousands of acres of marsh lands, too, which bound the rivers of Great Britain, in place of the scanty bite which they now afford, may be made to teem with the most luxuriant herbage ; for, by the salt water, the tussac will most assuredly flourish in its fullest perfection. We therefore look forward to the introduction and propagation of this extraordinary grass with no little interest ; as it must be expected to prove a great acquisition to all owners and holders of land congenial to its growth.—*EDIT.*]

New Discovery.—M. Bickes, a countryman of Sprengel and Liebig, is said to have discovered a process which would seem to consist in some preparation of the seed, by which he can grow luxuriant crops on the poorest land, and without any manure whatsoever ; and the cost of the process is so trifling, that, for the acre of wheat or maize it does not exceed 5d. sterling ; and for rape, cabbage, &c., amounts to only about half that sum !!!

ABSTRACT OF MR. RUFFIN'S ESSAY ON CALCAREOUS MANURES, & HIS ACCOUNTS OF EXPERIMENTS THEREWITH.

[Continued from page 147.]

Chemical examination of rich soils containing no calcareous earth.—Under common circumstances, when any disputant admits facts that seem to contradict his own reasoning, such admission is deemed abundant evidence of their existence. But though placed exactly in this situation, the facts admitted by me are so opposed to all that scientific agriculturists have taught us to expect, that it is necessary for me to show the grounds on which my admission rests. Few would have believed in the absence of calcareous earth in all our poor soils—and far more strange is it that the same deficiency should extend to such rich soils as some that will be cited.

The following specimens, taken from well-known and very fertile soils, were found to contain no calcareous earth. Many trials of other rich soils have yielded like results—and, indeed, I have never found calcareous earth in any soil below the Falls, in which, or near which, some particles of shells were not visible.

1. Soil from Eppes' Island, which lies in James River, near City Point; light and friable (but not silicious) brown loam, rich and durable. The surface is not many feet above the highest tides, and like most of the best river lands, this tract seems to have been formed by alluvion many ages ago, but which may be termed recent, when compared to the general formation of the tide-water district.

2. Black silicious loam from the celebrated lands on Back River, near Hampton.

3. Soil from rich land on Pocason River, York county.

4. Black clay vegetable soil, from a fresh-water tide marsh on James River—formed by the most recent alluvion.

5. Alluvial soil of first-rate fertility, above the Falls of James River: dark brown clay loam, from the valuable and extensive body of bottom land belonging to General J. H. Cocke, of Fluvanna.

The most remarkable facts of the absence of calcareous earth, are to be found in the limestone soils between the Blue Ridge and Alleghany mountains. Of these, I will report all that I have examined, and none contained any calcareous earth, unless the contrary is stated.*

* Before the first of these trials was made, I supposed (as probably most other persons do) that *limestone soil* was necessarily *calcareous*, and in a high degree. It is difficult to get rid of this impression entirely—and it may seem a contradiction in terms

1 to 6. Limestone soils selected in the neighbourhood of Lexington, Virginia, by Professor Graham, with the view of enabling me to investigate this subject. All the specimens were from first-rate soils, except one, which was from land of inferior value. One of the specimens, Mr. Graham's description stated to be "taken from a piece of land so rocky (with limestone) as to be unfit for cultivation—at least with the plough. I could scarcely select a specimen which I would expect to be more strongly impregnated with calcareous earth." This specimen, by two separate trials, yielded only one grain of calcareous earth, from one thousand of soil. The other six soils contained none. The same result was obtained from

7. A specimen of alluvial land on North River, near Lexington.

8. Brown loam from the Sweet Spring valley, remarkable for its extraordinary productiveness and durability. It is of alluvial formation, and before it was drained, must have been often covered and saturated by the Sweet Spring and other mineral waters, which hold lime in solution. The surrounding highland is limestone soil. Of this specimen, taken from about two hundred yards below the Sweet Spring, from land long cultivated every year, 360 grains yielded not a particle of calcareous earth. It contained an unusually large proportion of *oxide of iron*, though my imperfect means enabled me to separate and collect only eight grains, the process evidently wasting several more.

About a mile lower down, drains were then making (in 1826), to reclaim more of this rich valley from the overflowing waters. Another specimen was taken from the bottom of a ditch just opened, eighteen inches below the surface. It was a black loam, and exhibited to the eye some very diminutive fresh-water shells, (perriwinkles, about one-tenth of an inch in length,) and many of their broken fragments. This gave, from two hundred grains, seventy-four of calcareous earth. But, this cannot fairly be placed on the same footing with the other soils, as it had obviously been once the bottom of a stream, or lake, and the collection and deposit of so large and unusual a proportion of calcareous matter, seemed to be of animal formation. Both these specimens were selected at my request by one of our best farmers, and who also furnished a written description of the soils, and their situation.

9. High land in wood, west of Union, Monroe county. Soil a black clay loam, lying on, but not intermixed at the surface with limestone

to say that a *limestone soil* is not calcareous. This I cannot avoid: I must take the term *limestone soil* as custom has already fixed it. But it should not be extended to any soils except those which are so near to limestone rock, as in some measure to be thereby affected in their qualities and value.

rock. Subsoil, yellowish clay. The rock at this place a foot below the surface. Principal growth, sugar maple, white walnut, and oak. This and the next specimen are from one of the richest tracts of highland that I have seen.

10. Soil similar to the last, and about two hundred yards distant. Here the limestone showed above the surface, and the specimen was taken from between two large masses of fixed rock, and about a foot distant from each.

11. Black rich soil, from woodland between the Hot and Warm Springs, in Bath county. The specimen was part of what was in contact with a mass of limestone.

12. Soil from the western foot of the Warm Spring Mountain, on a gentle slope between the Court House and the road, and about one hundred and fifty yards from the Warm Bath. Rich brown loam, containing many small pieces of limestone, but no finely divided calcareous earth.

13. A specimen taken two or three hundred yards from the last, and also at the foot of the mountain. Soil, a rich black loam, full of small fragments of limestone of different sizes, between that of a nutmeg and small shot. The land had never been broken up for cultivation. One thousand grains contained two hundred and forty grains of small stone or gravel, mostly limestone, separated mechanically, and sixty-nine grains of finely divided calcareous earth.

14. Black loamy clay, from the excellent wheat-soil adjoining the town of Bedford in Pennsylvania: the specimen taken from beneath and in contact with limestone. One thousand grains yielded less than one grain of calcareous earth.

15. A specimen from within a few yards of the last, but not in contact with limestone, contained no calcareous earth: neither did the red clay subsoil, six inches below the surface.

16. Very similar soil, but much deeper, adjoining the principal street of Bedford—the specimen taken from eighteen inches below the surface and adjoining a mass of limestone. A very small disengagement of gas indicated the presence of calcareous earth—but certainly less than one grain in one thousand, and perhaps not half that quantity.

17. Alluvial soil on the Juniata, adjoining Bedford.

18. Alluvial vegetable soil, near the stream flowing from all the Saratoga mineral springs, and necessarily often covered and soaked by those waters, and

19. Soil taken from the bed of the same stream: neither contained any portion of carbonate of lime.

Thus it appears, that of nineteen specimens of soils, only four contained calcareous earth, and three of these four in exceedingly small proportions. It should be remarked that all these were selected from situations which, from their proximity to calcareous rock, or exposure to calcareous waters, were supposed most likely to present highly calcareous soils. If five hundred specimens had been taken without choice from what are commonly limestone soils (merely because they are not very distant from limestone rock, or springs of limestone water), the analysis of that whole number would be less likely to show calcareous earth than the foregoing short list. I therefore feel justified, from my own few examinations, and unsupported by any other authority, to pronounce that calcareous earth will very rarely be found in any soils between the falls of our rivers, and the navigable western waters. In a few specimens of some of the best soils from the borders of the Mississippi and its tributary rivers, I found calcareous earth present in all—but in small proportions, and in no case exceeding two per cent.

The foregoing details respecting limestone lands, may perhaps be considered an unnecessary digression in a treatise on the soils of the tide-water district. But the analysis of limestone soils furnishes the strongest evidence of the remarkable and novel fact of the general absence of calcareous earth—and the information thence derived will be used to sustain the following steps of my argument. All the examinations of soils in this chapter concur in opposing the general application of the proposition that the deficiency of calcareous earth is the cause of the sterility of our soils. Having stated the objection in all its force, I shall now proceed to enquire into its causes, and endeavour to dispel its apparent opposition to my doctrine.

Proofs of the existence of acids and neutral soils.—Sufficient evidence has been adduced to prove that many of our most fertile and valuable soils are destitute of calcareous earth; but it does not necessarily follow that such has always been their composition—or that they may not now contain lime combined with some other acid than the carbonic. That this is really the case, I shall now offer proofs to establish—and not only maintain this position with regard to those valuable soils, but shall contend that lime in some proportion, combined with *vegetable acid*, is present in every soil capable of supporting vegetation.

But while I shall endeavour to maintain these positions, without asking or admitting any exception, let me not be understood as asserting that the original ingredient of calcareous earth was always the sole cause of the fertility of any particular soil, or that a knowledge of the proportion contained, would serve to measure the capacity of the soil for

improvement. Calcareous soils not differing materially in qualities or value, often exhibit a remarkable difference in their respective proportions of calcareous earth : so that it would seem, that a small quantity, aided by some other unknown agent, may give as much capacity for improvement, and ultimately produce as much fertility, as ten times that proportion under other circumstances.

In all naturally poor soils, producing freely in their virgin state pine and whortleberry, and sorrel after cultivation, I suppose to have been formed some *vegetable acid*, which, after taking up whatever small quantity of lime might have been present, still remains in excess in the soil, and nourishes in the highest degree the plants named above, but is a poison to all useful crops ; and effectually prevents such soils becoming rich, from either natural or artificial applications of putrescent manures.

In a *neutral soil*, I suppose calcareous earth to have been sufficiently abundant to produce a high degree of fertility—but that it has been decomposed, and the lime taken up, by the gradual formation of vegetable acid, until the lime and the acid neutralize and balance each other, leaving no considerable excess of either. Such are all our fertile soils that are not calcareous.

These suppositions remain to be proved, in all their parts.

No opinion has been yet advanced that is less supported by good authority, or to which more general opposition may be expected, than that which supposes the existence of acid soils. The term *sour soil* is frequently used by farmers, but in so loose a manner as to deserve no consideration : it has been thus applied to any cold and ungrateful land, without intending that the term should be literally understood, and perhaps without attaching to its use any precise meaning whatever. Dundonald only, of all those who have applied chemistry to agriculture, has asserted the existence of vegetable acid in soils :* but he has offered no analysis, nor any other evidence to establish the fact—and his opinion has received no confirmation, nor even the slightest notice, from later and more able investigators of the chemical characters of soils. Kirwan and Davy profess to enumerate all the common ingredients of soils, and it is not intimated by either, that vegetable acid is one of them. Even this tacit denial by Davy, more strongly opposes the existence of vegetable acid, than it is supported by the opinion of Dundonald, or any of those writers on agriculture who have admitted its existence. Grisen-thwaite, a late writer on agricultural chemistry, and who has the advantage of knowing the discoveries, and comparing the opinions of all his predecessors, expressly denies the possibility of any acid existing in

* Dundonald's Connection of Chemistry and Agriculture.

soils. His *New Theory of Agriculture* contains the following passage : " Chalk has been recommended as a substance calculated to correct the sourness of land. It would surely have been a wise practice to have previously ascertained this existence of acid, and to have determined its nature, in order that it might be effectually removed. The fact really is, that no soil was ever yet found to contain any notable quantity of acid. The acetic and the carbonic are the only two that are likely to be generated by any spontaneous decomposition of animal or vegetable bodies, and neither of them have any fixity when exposed to the air." Thus, then, my doctrine is deprived of even the feeble support it might have had from Dundonald's mere opinion, if that opinion had not been contradicted by later and better authority ; and the only support that I can look for, will be in the facts and arguments that I shall be able to adduce.

I am not prepared to question what Grisenthwaite states as a chemical fact, " that no soil was ever yet found to contain any notable quantity of acid." No soil examined by me for this purpose, gave any evidence of the presence of uncombined acid. Still, however, the term acid may be applied with propriety to soils in which growing vegetables continually receive acid from the decomposition of others (for which no "fixity" is requisite), or in which acid is present, not free, but combined with some base, by which it is readily yielded to promote, or retard, the growth of plants in contact with it. It will be sufficient for my purpose to show that certain soils contain some substance, or possess some quality, which promotes almost exclusively the growth of acid plants—that this power is strengthened by adding known vegetable acids to the soil—and is totally removed by the application of calcareous manures, which would necessarily destroy any acid, if it were present. Leaving it to chemists to determine the nature and properties of this substance, I merely contend for its existence and effects ; and the cause of these effects, whatever it may be, for the want of a better name, I shall call *acidity*.

The proofs now to be offered in support of the existence of acid and neutral soils, however weak each may be when considered alone, yet when taken in connection, will together form a body of evidence not easily to be resisted.

1st proof. Pine and common sorrel have leaves well known to be acid to the taste : and their growth is favoured by the soils which I suppose to be acid, to an extent which would be thought remarkable in other plants on the richest soils. Except wild locust on the best river land, no growth can compare in rapidity with pines on soils naturally poor, and even greatly reduced by long cultivation. Pines usually stand

so thick on old exhausted fields, that the increase of size in each plant is greatly retarded—but if the whole growth of an acre is estimated, it would probably exceed in quantity that of the richest soils of the same age and on the same space. Every cultivator of corn on poor light soil knows how rapidly sorrel * will cover his otherwise naked field, unless kept in check by continual tillage—and that to root it out, so as to prevent the like future labour, cannot be effected by any mode of cultivation whatever. This weed, too, is considered far more hurtful to growing crops than any other of equal size. Yet neither of these acid plants can thrive on the best lands. Sorrel cannot even live on a calcareous soil; and if a pine is sometimes found there, it has nothing of its usual elegant form, but seems as stunted and ill-shaped as if it had always suffered for want of nourishment. Innumerable facts, of which these are examples, prove that these acid plants must derive from their favourite soil some kind of food peculiarly suited to their growth, and quite useless, if not hurtful, to cultivated crops.

2. Dead acid plants are the most effectual in promoting the growth of living ones. When pine leaves are applied to a soil, whatever acid they contain is of course given to that soil, for such time as circumstances permit it to retain its form or peculiar properties. Such an application is often made on a large scale, by cutting down the second growth of pines on land once under tillage, and suffering them to lie a year before clearing and cultivating the land. The invariable consequence of this course is a growth of sorrel for one or two crops, so abundant and so injurious to the crops, as to more than balance any benefit derived by the soil from the vegetable matter having been allowed to rot. From the general experience of this effect, most persons tend pine land as soon as cut down, after carefully burning the whole of the heavy cover of leaves, both green and dry. Until within a few years, it was generally supposed that the leaves of pine were worthless, if not hurtful, in all applications to cultivated land; which opinion, doubtless, was founded on such facts as have been just stated. But if they are used as litter for cattle, and heaped to ferment, the injurious quality of pine leaves is destroyed, and they become a valuable manure. This practice is but of recent origin, but it is highly approved, and rapidly extending.

* *Rumex acetosa*. The wood sorrel (*oxalis acetosella*) is of a very different character. This prefers rich and calcareous soils, and I have seen it growing on places calcareous to excess. It would seem, therefore, that wood sorrel forms its acid from the atmosphere, and does not draw it from the soil, as is evidently the case with common sorrel.

On one of the washed and barren declivities (or *galls*) which are so numerous on all our farms, I had the small gullies packed full of green pine bushes, and then covered with the earth drawn from the equally barren intervening ridges, so as nearly to smooth the whole surface. The whole piece bore nothing previously except a few scattered tufts of poverty-grass and dwarfish sorrel, all of which did not prevent the spot from seeming quite bare at midsummer, if viewed at the distance of one hundred yards. This operation was performed in February or March. The land was not cultivated, nor again observed until the second summer afterwards. At that time, the piece remained as bare as formerly, except along the filled gullies, which throughout the whole of their crooked courses were covered by a thick and tall growth of sorrel, remarkably luxuriant for any situation, and which being bounded exactly by the width of the narrow gullies, had the appearance of some vegetable sown thickly in drills, and kept clean by tillage. So great an effect of this kind has not been produced within my knowledge—though facts of like nature and leading to the same conclusion, are of frequent occurrence. If small pines standing thinly over a broom-grass old field, are cut down and left to lie, under every top will be found a patch of sorrel, before the leaves have all rotted.

3. The growth of sorrel is not only peculiarly favoured by the application of vegetables containing acids already formed, but also by such matters as will form acid in the course of their decomposition. Farm-yard manure, and all other putrescent animal and vegetable substances, form *acetic acid* as their decomposition proceeds.* If heaps of rotting manure are left without being spread, in a field the least subject to produce sorrel, a few weeks of growing weather will bring out that plant close around every heap—and for some time, it will continue to show more benefit from that rank manuring than any other grass. For several years my winter-made manure was spread and ploughed in on land not cultivated until the next autumn or the spring after. This practice was founded on the mistaken opinion, that it would prevent much of the usual exposure to evaporation and waste of the manure. One of the reasons which alone would have compelled me to abandon this absurd practice, was, that a crop of sorrel always followed (even on good soils that before barely permitted a scanty growth to live), which so injured the next grain crop as greatly to lessen the benefit from the manure. Sorrel unnaturally produced by such applications, does not infest the land longer than until we may suppose the acid to have been removed by cultivation and other causes.

* Agr. Chem. p. 187.

It may be objected that my authorities prove only the formation of a single vegetable acid in the soil, the acetic—that my facts show only the production of a single acid plant, sorrel,—and that the acid which sorrel contains is not the acetic, but the oxalic.* From the application of acids to recently ploughed land, no acid plant except sorrel is made to grow, because that only can spring up speedily enough to arrest the fleeting nutriment. Poverty-grass grows only on the same kinds of soil, and generally covers them after they have been a year free from a crop, but does not show sooner; and broom-grass and pines require two years before their seeds will produce plants. But when pines begin to spread over the land, they soon put an end to the growth of all other plants, and are abundantly supplied with their acid food from the dropping of their own leaves. Thus they may be first supplied with the vegetable acid ready formed in the leaves, and afterwards with the acetic acid formed by their subsequent slow decomposition. It does not weaken my argument, that the product of a plant is a vegetable acid different from the one supposed to have nourished its growth. All vegetable acids (except the prussic), however different in their properties, are composed of the same three elementary bodies, differing only in their proportions†—and consequently are all resolvable into each other. A little more or a little less of one or the other of these ingredients, may change the acetic to the oxalic acid, and that to any other. We cannot doubt but that such simple changes may be produced by the chemical powers of vegetation, when others are effected far more difficult for us to comprehend. The most tender and feeble organs and the mildest juices, aided by the power of animal or vegetable life, are able to produce decompositions and combinations which the chemist cannot explain, and which he would in vain attempt to imitate.

4. This ingredient of soils which nourishes acid plants, also poisons cultivated crops. Plants have not the power of rejecting noxious fluids, but take up by their roots everything presented in a soluble form.‡ Thus the acid also enters the sap vessels of cultivated plants, stunts their growth, and makes it impossible for them to attain that size and perfection which their proper food would ensure, if it was presented to them without its poisonous accompaniment. When the poorest virgin woodland is cut down, it is covered and filled to excess with leaves and other rotted and rotting vegetable matters. Can a heavier vegetable manuring be desired? And as it completely rots during cultivation,

* Agr. Chem. Lecture 3.

† Carbon, Oxygen and Hydrogen. Agr. Chem. Lecture 3, p. 78

‡ Agr. Chem., Lecture 6, page 186.

must not it offer to the growing as abundant a supply of food as they can require? Yet the best product obtained may be from ten to fifteen bushels of corn, or five or six of wheat, soon to come down to half these quantities. If the noxious quality which causes such injury is an acid, it is as certain as any chemical truth whatever, that it will be neutralized, and its powers destroyed by applying enough of calcareous earth to the soil; and precisely such effects are found whenever that remedy is tried. On land thus relieved of this unceasing annoyance, the young corn no longer appears of a pale and sickly green, approaching to yellow, but takes immediately a deep healthy colour, by which it may readily be distinguished from any remaining in its former state, before there is any perceptible difference in size. The crop will produce fifty to one hundred per cent more the first year, before its supply of food can possibly have been increased—and the soil is soon found not only cleared of sorrel, but incapable of producing it. I have anticipated these effects of calcareous manures, but they will hereafter be established beyond contradiction.

5. The truth of the existence of either acid or neutral soils, depends on the existence of the other—and to prove either, will necessarily establish both. If acid exists in soils, then wherever it meets with calcareous earth, the two substances must combine and neutralize each other, so far as their proportions are properly adjusted. On the other hand, if I can show that the compounds of lime and vegetable acid are present in most soils, it follows inevitably that nature has provided means by which soils can generally obtain this acid; and if the amount formed can balance the lime, the operation of the same causes can exceed that quantity, and leave an excess of free acid. From these premises will be deduced the following proofs.

It has been previously stated that the process recommended by chemists for finding the calcareous earth in soils was unfit for that purpose, because a *precipitate* was always obtained even when no calcareous earth or carbonate of lime was present. Frequent trials have shown me that this precipitate is considerably more abundant from good soils than bad. The substance thus obtained from rich soils by solution and precipitation, in every case that I have tried, contains some calcareous earth, although the soil from which it was derived had none. The alkaline liquor from which the precipitate has been separated, we are told will, after boiling, let fall the carbonate of magnesia, if any had been in the soil; but when any notable deposit is thus obtained, it will often be found to consist more of carbonate of lime, than of magnesia. The following are examples of such products:

One thousand grains of tide-marsh soil (described page 201) acted on

by muriatic acid in the pneumatic apparatus, gave out no carbonic acid gas, and therefore could have contained no carbonate of lime. The precipitate obtained from the same weighed 16 grains—which being again acted on by sulphuric acid, evolved as much gas as showed that three grains had become carbonate of lime, in the previous part of the process.

Two hundred grains of alluvial soil from Saratoga Springs (page 203, No. 18,) containing no carbonate of lime, yielded a precipitate of 12 grains, of which three was carbonate of lime—and a deposit from the alkaline solution weighing six grains, four of which was carbonate of lime.

Seven hundred grains of limestone soil from Bedford (part of the specimen marked 14, page 203,) contained about two-thirds of a grain of carbonate of lime—and its precipitate of 28 grains only yielded two grains; but the alkaline solution deposited 11 grains of the carbonates of lime and magnesia, of which at least five was of the former, as there remained seven and a-half of solid matter after the action of sulphuric acid.*

From this process, there can be no doubt but that the soil contained a proportion of some *salt of lime* (or lime combined with some kind of acid) which being decomposed by and combined with the muriatic acid, was then precipitated, not in its first form, but in that of carbonate of lime—it being supplied with carbonic acid from the carbonate of potash used to produce the precipitation. The proportions obtained in these cases were small; but it does not follow that the whole quantity of lime contained in the soil was found. However, to the extent of this small proportion of lime, is proved clearly the presence of enough of some acid (and that not the carbonic) to combine with it. Neither could it have been the sulphuric or the phosphoric acid; for though both the sulphate and phosphate of lime are in some soils, yet neither of these salts can be decomposed by muriatic acid.

6. The strongest objection to the doctrine of neutral soils is, that if true the salt formed by the combination of the lime and acid must

* The measurement of the carbonic acid gas evolved, was relied on to show the whole amount of carbonates present—and sulphuric acid was used to distinguish between lime and magnesia, in the deposit from the alkaline solution. If any alumine or magnesia had made part of the solid matter exposed to diluted sulphuric acid, the combinations formed would have been soluble salts, which would of course have remained dissolved and invisible in the fluid. Lime only of the four earths forms with sulphuric acid a substance but slightly soluble, and which therefore can be mostly separated in a solid form. The whole of this substance (sulphate of lime) cannot be obtained in this manner, as a part is always dissolved; but whatever is obtained, proves that at least two-thirds of that quantity of carbonate of lime had been present.

often be present in such large proportions, that it is scarcely credible that its presence and nature should not have been discovered by any of the chemists who have analyzed soils. This difficulty I cannot remove; but it may be met (or neutralized, to borrow a figure from my subject,) by showing that an equal difficulty awaits those who may support the other side of the argument. The theory of geologists, of the formation of soils from the decomposition or disintegration of rocks, is received as true by scientific agriculturists. The soils thus supposed to be formed, receive admixtures from each other, by means of different operations of nature, and after being more or less enriched by the decay of their own vegetable products, make the endless variety of existing soils.* But where a soil lying on, and thus formed from any particular kind of rock, is so situated that it could not have been moved, or received considerable accessions from torrents or other causes, then, according to this theory, the rock and soil should be composed of the same materials; and such soils as the specimens marked 11 and 16 (page 203) would be, like the rock they touched, nearly pure calcareous earth. Such are the doctrines received and taught by Davy, or the unavoidable deductions from them. But without contending for the full extent of this theory of the formation of soils (because I consider it almost entirely false), every one must admit that soils thus situated, must have received in the lapse of ages some accessions to their bulk, from the effects of frost, rain, sun, and air, on the limestone in contact with them. All limestone soils, properly so called, exhibit certain marked and peculiar characters of colour, texture, and products, which can only be derived from receiving into their composition more or less of the rock which lies beneath, or rises above their surface. This mixture will not be denied by any one who has observed limestone soils, and reasons fairly, whether his investigation begins with the causes or their effects. If then all this gain of calcareous earth remains in the soil, why is none, or almost none, discovered by accurate chemical analysis? Or, if it be supposed not present, nor yet changed in its chemical character, in what possible manner could a ponderous and insoluble earth have made its escape from the soil? To remove this obstacle without admitting the operation of acid in making such soils neutral, will be attended with at least as much difficulty as any arising from that admission being made.

7. But we are not left entirely to conjecture that soils were once more calcareous than they now are, if chemical tests can be relied on to furnish proof. Acid soils that have received large quantities of cal-

* Agr. Chem. p. 131. Also Treatise on Agriculture (by General Armstrong) in vol. i. of American Farmer.

calcareous earth as manure, after some time, will yield very little when analyzed. To a soil of this kind, full of vegetable matter, I applied in 1818 and 1821, fossil shells at such a known and heavy rate as would have given to the soil (by calculation) at least three per cent of calcareous earth, for the depth of five inches. Only a small portion of the shelly matter was finely divided when applied. Since the application of the greater part of this dressing (only one-fourth having been laid on in 1818), no more than six years had passed before the following examinations were made—and the cultivation of five crops in that time, three of which were horse-hoed, must have well mixed the calcareous earth with the soil. Three careful examinations gave the following results.

No. 1.—1000 grains yielded of coarse calcareous earth	7½
And of finely divided less than	½
	8
No. 2.—1000 grains.—Coarse	5
Finely divided	2
	7
No. 3.—1500 grains.—Coarse	15
Finely divided	2½
	17½

The specimens No. 1 and No. 2 were obtained by handfuls of soil from several places (four in one case and twelve in another), mixing them well together, and then taking the samples for trial from the two parcels. On such land, when not recently ploughed, there will always be an over proportion of the pieces of shells on the surface, as the rains have settled the fine soil, and left exposed the coarse matters. On this account, in making these two selections, the upper half inch was first thrown aside, and the handful dug from below. No. 3 was taken from a spot showing a full average thickness of shells, and included the surface. I considered the three trials made as fairly as possible, to give a general average. Small as is the proportion of finely divided calcareous earth exhibited, it must have been increased by rubbing some particles from the coarse fragments, in the operation of separating them by a fine sieve. Indeed it may be doubted whether any proportion remained very finely divided—or in other words, whether it was not combined with acid as fast as it was so reduced. But without the benefit of this supposition, the finely divided calcareous earth in the three specimens averaged only one and one-fourth grains the thousand, which is one twenty-fourth of the quantity laid on; and the total quantity obtained,

of coarse and fine, is eight grains in one thousand, or about one-fourth of the original proportion. All the balance had changed its form, or otherwise disappeared, in the few years that had passed since the application.

The very small proportion of finely divided calcareous earth compared with the coarse, in some shelly soils, furnishes still stronger evidence of this kind. Of the York River soil (described page 146, No. 5.)

	Grains.
1260 grains yielded of coarse calcareous parts.	168
And of finely divided	8
1044 of the rich Nansemond soil (No. 6).—Coarse.	544
Fine	18

As many of the shells and their fragments in these soils are in a mouldering state, it is incredible that the whole quantity of finely divided particles derived from them should have amounted to no more than these small proportions. Independent of the action of natural causes, the plough alone, in a few years, must have pulverized at least as much of the shells as was found.

8. In other cases, where the operations of nature have been applying calcareous earth for ages, none now remains in the soil; and the proof thence derived is more striking than any obtained from artificial applications of only a few years standing. Valleys subject to be frequently overflowed and saturated by the water of limestone streams, must necessarily retain a new supply of calcareous earth from every such soaking and drying.

Limestone water contains the *super-carbonate of lime*, which is soluble; but this loses its excess of carbonic acid when left dry by evaporation, and becomes the carbonate of lime, which not being soluble, is in no danger of being removed by subsequent floods. Thus accessions are slowly but continually made, through many centuries. Yet such soils are found containing no calcareous earth—of which a remarkable example is presented in the soil of the cultivated part of the Sweet Spring Valley, (No. 8, page 202,)*

* The excess of carbonic acid which unites with lime and renders the compound soluble in water, is lost by exposure of the calcareous water to the air, as well as by evaporation to dryness. (Accum's Chemistry—Lime.) The masses of soft calcareous rock which are deposited in the rapids of limestone streams, are examples of the loss of carbonic acid from exposure to the air; and the stalactites in caves, the deposit of the slow-dropping calcareous water holding in solution the super-carbonate of lime, are examples of the same effect produced by evaporation. A similar deposit of insoluble carbonate of lime, from both these causes, is necessarily made on all land subject to be overflowed by limestone waters.

9. All *wood ashes* contain salts of lime (and most kinds in large proportions), which could have been derived from no other source than the soil on which the trees grew. The lime thus obtained is principally combined with carbonic acid, and partly with the phosphoric, forming phosphate of lime. The table of Saussure's analyses of the ashes of numerous plants,* is sufficient to show that these products are general, if not universal. The following examples of some of my own examinations, prove that ashes yield calcareous earth in proportions suitable to their kind, although the wood grew on soils destitute of that ingredient—as was ascertained with regard to each of these soils.

100 grains of Ashes from	What Soil taken from.	Carbonate of Lime.	Carbonate of Lime.
Whortleberry bushes, the entire plants, except the leaves	Acid silicious loam.....	4 grains	4 grains
Equal parts of the bark, heart, and sapwood of an old locust	The same.....	51 "	18 "
Young locust bushes entire	Rich neutral clay loam..	40 "	30 "
Young pine bushes.....	Acid silicious loam.....	9 "	6 "
Body of a young pine tree	Acid clay soil	14 "	18 "

The potash was first carefully taken out of all these samples. The remaining solid matter was silicious sand and charcoal; the proportion of the latter varying according to the degree of heat used in burning the wood, which was not permitted to be very strong, for fear of converting the calcareous earth into quick-lime.

All the *carbonate of lime* yielded by ashes was necessarily furnished in some form by the soil on which the plants grew; and when the soil itself contained no *carbonate*, some other compound of lime must have been present to enable us to account for these certain and invariable results. The presence of a combination of lime with some *vegetable* acid, and none other, would serve to produce such effects. According to established chemical laws, if any such combination had been taken up into the sap-vessels of the tree, it would be decomposed by the heat necessary to convert the wood to ashes; the acid would be reduced to its elementary principles, and the lime would immediately unite with the carbonic acid (which is produced abundantly by the process of combustion), and thus present a product of *carbonate of lime* newly formed from the materials of the other substances decomposed.†

* Quoted in Agr. Chem. Lecture 3.

† The reasoning on the presence of the carbonate of lime found in ashes from acid soils, does not apply to the phosphate of lime which is always also present. The latter salt is not decomposed by any degree of heat (Art. *Chemistry*, in *Edin. Ency.*), and therefore might have remained unchanged in passing from the soil to the tree, and thence to the ashes.

On the foregoing facts and deductions, I am content to rest the truth of the existence of acid and neutral soils. Supposing the doctrine to be sufficiently proved, it may be useful to trace the formation of acidity in different soils, according to the views which have been presented, and to display the promise which that quality holds out for improving those soils which it has hitherto rendered barren and worthless.

Every neutral soil at some former time contained calcareous earth in sufficient quantity to produce the uniform effect of that ingredient, of storing up and fixing fertility. The decomposition of the successive growths of plants left to rot on the rich soil, continually formed vegetable acid, which slowly and gradually united with the lime in the soil. At last these two principles balanced each other, and the soil was no longer calcareous, but became neutral. Instead of its former ingredient, carbonate of lime, it was now supplied with a *vegetable salt of lime*. This change of soil does not affect the natural growth, which remains the same, and thrives as well as when the soil was calcareous, and when brought into cultivation the soil is equally productive under all crops suited to calcareous soils. If the supplies of vegetable matter continue, the soil may even become acid in some measure, as may be evidenced by the growth of sorrel, but without losing any of its fertility before acquired. The quantity of acidity in any soil frequently varies: it is increased by the growth of such plants as delight to feed on it, and by the decomposition of all vegetable matters. Hence the longer a poor field remains at rest, and not grazed, the more acid it becomes; and this evil keeping pace with the benefits derived, is the cause why so little improvement or increased product is obtained from putting acid soils under that mild treatment. Cultivation not only prevents new supplies, but also diminishes the acidity already present in excess, by exposing it the atmosphere; and the more a soil is exhausted, the more will its acidity be lessened.

We have seen that even acid soils contain a little salt of lime, and therefore must have once been slightly calcareous. Indeed it may well be doubted whether any soil destitute of lime in any form, would not soon become a perfect barren, incapable of producing a spire of grass. But such small proportions of calcareous earth were soon equalled, and then exceeded, by the formation of vegetable acid, before much productiveness was caused. The soil being thus changed, the plants suitable to calcareous soils died off, and gave place to others, which produce as well as feed and thrive on acidity. Still, however, even these plants furnish abundant supplies of vegetable matter sufficient to enrich the land in the highest degree: but the antiseptic power of the acid pre-

vents the leaves from rotting for years, and then the soil has no power to profit by them. Though continually wasted, the vegetable matter is always present in abundance, but must remain almost useless to the soil, until the accompanying acidity shall be destroyed.

Nearly all the woodland now remaining in Lower Virginia, and much of what has long been arable, is rendered unproductive by acidity, and successive generations have toiled on them without remuneration, and without suspecting that their worst virgin land was then richer than their manured lots appeared to be. The cultivator of such soil, who knows not its peculiar disease, has no other prospect than a gradual decrease of his always scanty crops. But if the evil is once understood, and the means of its removal within his reach, he has reason to rejoice that his soil was so constituted as to be preserved from the effects of the improvidence of his forefathers, who would have worn out any land not almost indestructible. The presence of acid, by restraining the productive powers of the soil, has in a great measure saved it from exhaustion; and after a course of cropping which would have utterly ruined soils much better constituted, the powers of our acid land remain not greatly impaired, though dormant, and ready to be called into action by merely being relieved of its acid quality. A few crops will reduce a new acid field to such a low product that it scarcely will pay for its cultivation; but no great change is afterwards caused, by continuing scourging tillage and grazing for fifty years longer. Thus our acid soils have two remarkable and opposite qualities, both proceeding from the same cause: they cannot be enriched by manure nor impoverished by cultivation to any great extent. Qualities so remarkable deserve all our powers of investigation; yet their very frequency seems to have caused them to be overlooked; and our writers on agriculture have contrived to urge those who seek improvement to apply precepts drawn from English authors, to soils which are totally different from all those for which their instructions were intended.

The mode of operation of calcareous earth in soils.—Proposition 3.—The fertilizing effects of calcareous earth are chiefly produced by its power of neutralizing acids, and of combining putrescent manures with soils, between which there would otherwise be but little, if any, chemical attraction.

Proposition 4.—Poor and acid soils cannot be improved durably, or profitably, by putrescent manures, without previously making them calcareous, and thereby correcting the defect in their constitution.

It has already been made evident that the presence of calcareous earth in a natural soil causes great and durable fertility; but it still remains

to be determined, to what properties of this earth its peculiar fertilizing effects are to be attributed.

Chemistry has taught, that silicious earth in any state of division attracts but slightly, if at all, any of the parts of putrescent animal and vegetable matters.* But even if any slight attraction really exists when the earth is minutely divided for experiments in the laboratory of the chemist, it cannot be exerted by silicious sand in the usual form in which nature gives it to soils; that is, in particles comparatively coarse, loose, and open, and yet each particle impenetrable to any liquid or gaseous fluid that might be passing through the vacancies. Hence, silicious earth can have no power, chemical and mechanical, either to attract enriching manures, or to preserve them when actually placed in contact with it: and soils in which the qualities of this earth greatly predominate, must give out freely all they have received, not only to a growing crop, but to the sun, air, and water, so as soon to lose the whole. No portion of putrescent matter can remain longer than the completion of its decomposition—and if not arrested during this process, by the roots of living plants, all will escape in the form of *gas* into the air, without leaving a trace of lasting improvement. With a knowledge of these properties, we need not resort to the common opinion that manure sinks through sandy soils, to account for its rapid disappearance.†

* Agr. Chem. page 129.

† Except the very small proportions of earthy, saline and metallic matters that may be in animal and vegetable manures, the whole balance of their bulk (and the whole of whatever can feed plants) is composed of different elements, which are known only in the form of *gases*, into which they must be finally resolved, after going through all the various stages of fermentation and decomposition. So far from sinking in the earth, these final results could not be possibly confined there, but must escape into the atmosphere as soon as they take a gaseous form, unless immediately taken up by the organs of growing plants. It is probable that but a small portion of any dressing of manure remains long enough in the soil to make this final change—and that nearly all is used by growing plants during previous changes, or carried off by air or water. During the progress of the many changes caused by fermentation and decomposition, every soluble product may certainly sink as low as the rains penetrate: but it cannot descend lower than the water, and that, together with the soluble manure, will be again drawn up by the roots of plants. One exception, however, seems probable. Should the soil need draining, to take off the water passing beneath the surface, the soluble manure might be carried off by those springs; and thus supposed results receive strong confirmation from the complete loss of fertility which is often observed in spots over a foundation that is springy in wet seasons, but which have been kept under tillage without being drained. We are as yet but little informed as to the particular changes made, and the various new substances successively formed and then decomposed, during the whole duration of putrescent manures in the soil—and no field for discovery would better reward the investigations of the agricultural chemist. For want of this knowledge we proceed at random in using manures, instead of being enabled to conform to any rule founded on scientific principles: nor can we hope so to manage manures with regard to their fer-

Aluminous earth, by its closeness, mechanically excludes those agents of decomposition, heat, air, and moisture, which sand so freely admits; and therefore soils in which this earth predominates give out manure much more slowly than sand, whether for waste or for use. The practical effect of this is universally understood—that clay soils retain manure much longer than sand, but require much heavier applications to show as much effect at once. But as this means of retaining manure is altogether mechanical, it serves only to delay both its use and its waste. Aluminous earth also exerts some chemical power in attracting and combining with manures, but too weakly to enable a clay soil to become rich by natural means.

Davy states that both aluminous and calcareous earth will combine with any vegetable extract, so as to render it less soluble, and consequently not subject to the waste that would otherwise take place; and hence, that “the soils which contain most alumina and carbonate of lime, are those which act with the greatest chemical energy in preserving manures.” Here is high authority for calcareous earth possessing the power which my subject requires, but not in so great a degree as I think it deserves. Davy apparently places both earths in this respect on the same footing, and allows to aluminous soils retentive powers equal to the calcareous. But though he gives evidence (from chemical experiments) of this power in both earths, he does not seem to have investigated the difference of their forces. Nor could he deem it very important, holding the opinion which he elsewhere expresses, that calcareous earth acts “merely by forming a useful earthy ingredient in the soil,” and consequently attributing to it no remarkable chemical effect as a manure. I shall offer some reasons for believing that the powers of attracting and retaining manure, possessed by these two earths, differ greatly in force.

Our aluminous and calcareous soils, through the whole of their virgin state, have had equal means of receiving vegetable matter; and if their powers for retaining it were nearly equal, so would be their acquired fertility. Instead of this, while the calcareous soils have been raised to the highest condition, many of the tracts of clay soil remain the poorest and most worthless. It is true that the one laboured under acidity, from which the other was free. But if we suppose nine-tenths of the vegetable matter to have been rendered useless by that poisonous quality, the remaining tenth, applied for so long a time, would have made any soil fertile that had the power to retain the enriching matter.

mentation, the time and manner of application, mixing with other substances, &c., as to enable the crops to seize every enriching result as soon as it is produced, and to postpone as long as possible the final result of decomposition.

Calcareous earth has power to preserve those animal matters which are most liable to waste, and which give to the sense of smell full evidence when they are escaping. Of this, a striking example is furnished by an experiment which was made with care and attention. The carcase of a cow that was killed by accident in May, was laid on the surface of the earth and covered with about seventy bushels of finely divided fossil shells and earth (mostly silicious), their proportions being as thirty-six to sixty-four. After the rains had settled the heap, it was only six inches thick over the highest point of the carcase. The process of putrefaction was so slow, that several weeks passed before it was over; nor was it ever so violent as to throw off any effluvia that the calcareous earth did not intercept in its escape, so that no offensive smell was ever perceived. In October the whole heap was carried out and applied to one-sixth of an acre of wheat—and the effect produced far exceeded that of the calcareous manure alone, which was applied at the same rate on the surrounding land. No such power as this experiment indicated will be expected from clay.

Quick-lime is used to prevent the escape of offensive effluvia from animal matter; but its operation is entirely different from that of calcareous earth. The former effects its object by "eating" or decomposing the animal substance (and nearly destroying it as manure), before putrefaction begins. The operation of calcareous earth is to moderate and retard, but not to prevent putrefaction; not to destroy the animal matter, but to preserve it effectually by forming new combinations with the products of putrefaction. This mode of using calcareous earth might be practised to great advantage near towns, where carcases and other animal matters are so abundant as to be a public nuisance.

The power of calcareous earth to combine with and retain putrescent manures, implies the power of fixing them in any soil to which both are applied. The same power will be equally exerted if the putrescent manure is applied to a soil which had previously been made calcareous, whether by nature or by art. When a chemical combination is formed between the two kinds of manure, the one is necessarily as much fixed in the soil as the other. Neither air, sun, or rain, can then waste the putrescent manure, because neither can take it from the calcareous earth with which it is chemically combined. Nothing can effect the separation of the parts of this compound manure, except the attractive power of growing plants—which, as all experience shows, will draw their food from this combination as fast as they require it, and as easily as from sand. The means, then, by which calcareous earth acts as an improving manure, are, *completely preserving putrescent manures from waste, and*

yielding them freely for use. These particular benefits, however great they may be, cannot be seen very quickly after a soil is made calcareous, but will increase with time and with the means for obtaining vegetable matters, until their accumulation is equal to the soil's power of retention. The kind or the source of enriching manure does not alter the process described. The natural growth of the soil, left to die and rot, or other putrescent manures collected and applied, would alike be seized by the calcareous earth and fixed in the soil.

This, the most important and valuable operation of calcareous earth, gives nothing to the soil, but only secures the other manures, and gives *them* wholly to the soil. In this respect the action of calcareous earth on soils is precisely like that of *mordants* in "setting" or fixing colours. When alum, for example, is used by the dyer for this purpose, it adds not the slightest tinge of itself, but it holds to the cloth, and also to the otherwise fleeting dye, and thus fixes them permanently together. Without the mordant, the colour might have been equally vivid, but would be lost by the first wetting of the cloth.

The next most valuable property of calcareous manures for the improvement of soil, is their *power of neutralizing acids*, which has already been incidentally brought forward in the preceding chapter. According to the views already presented, our poorest cultivated soils contain more vegetable matter than they can beneficially use—and when first cleared have it in great excess. So antiseptic is the acid quality of poor woodland, that before the crop of leaves of one year can entirely rot, two or three others will have fallen—and there are always enough at any one time, to greatly enrich the soil, if the leaves could be rotted and fixed in it at once.* The presence of acid, by preventing or retarding putrefaction, keeps the vegetable matter inert, and even hurtful on cultivated land; and the crops are still further injured, by taking up the poisonous acid with their nutriment. A sufficient quantity of calcareous earth mixed with such a soil will immediately neutralize the acid and destroy its powers:

* The antiseptic effect of vegetable acid in our soils receives some support from the facts established with regard to *peat soils*, in which vegetable acids have been discovered by chemical analysis: and though the peat or moss soils of Britain differ entirely from any soils in this country, still, some facts relating to the former class may throw light on the properties of our own soils, different as they may be. Not only does vegetable matter remain without putrefaction in peat soils and bogs, and serve to increase their depth by regular accessions from the successive annual growths, but even the bodies of beasts and men have been found unchanged under peat, many years after they had been covered. (Alton's Essay on Moss Earth.) It is well known that the leaves of trees rot very quickly on the rich limestone soils of the western states, while the successive crops of several years growth may be always found on our acid woodland, in the different stages of their slow decomposition.

the soil, released from its baneful influence, will be rendered capable, for the first time, of exerting the fertility which it really possessed. The benefit thus produced is almost immediate; but though the soil will show a new vigour in its earliest vegetation, and may even double its first crop, yet no part of that increased product is due to the direct operation of the calcareous manure, but merely to the removal of acidity. The calcareous earth, in such a case, has not made the soil richer in the slightest degree, but has merely permitted it to bring into use the fertility it had before, and which was concealed by the acid character of the soil. It will be a dangerous error for the farmer to suppose that calcareous earth can enrich soil by direct means. It destroys the worst foe of productiveness, and uses to the greatest advantage the fertilizing powers of other manures; but of itself it gives no fertility to soils, nor furnishes the least food to growing plants.

These two kinds of action are by far the most powerful of the means possessed by calcareous earth for fertilizing soils. It has another, however, of great importance—or rather two others, which may be best described together as the *power of altering the texture and absorbency of soils*.

At first it may seem impossible that the same manure could produce such opposite effects on soils, as to lessen the faults of being either too sandy or too clayey—and the evils occasioned by both the want and the excess of moisture. Contradictory as this may appear, it is strictly true as to calcareous earth. In common with clay, calcareous earth possesses the power of making sandy soils more close and firm—and in common with sand, the power of making clay soils lighter. When sand and clay thus alter the textures of soils, their operation is altogether mechanical; but calcareous earth must have some chemical action also in producing such effects, as its power is far greater than that of either sand or clay. A very great quantity of clay would be required to stiffen a sandy soil perceptibly, and still more sand would be necessary to make a clay soil much lighter; so that the cost of such improvement would generally exceed the benefit obtained. Greater effects on the texture of soils are derived from less quantities of calcareous earth, besides obtaining the more valuable operation of its other powers.

Every substance that is open enough for air to enter, and the particles of which are not absolutely impenetrable, must absorb moisture from the atmosphere. Aluminous earth, reduced to an impalpable powder, has strong absorbing powers. But this is not the form in which soils can act; and a close and solid clay will scarcely admit the passage of air or water, and therefore cannot absorb much moisture,

except by its surface. Through sandy soils the air passes freely, but most of its particles are impenetrable by moisture, and therefore these soils are also extremely deficient in absorbent power. Calcareous earth, by rendering clay more open to the entrance of air, and closing partially the too open pores of sandy soils, increases the absorbent powers of both. To increase that power in any soil, is to enable it to draw supplies of moisture from the air in the driest weather, and to resist more strongly the waste by evaporation of light rains. A calcareous soil will so quickly absorb a hasty shower of rain, as to appear to have received less than adjoining land of different character; and yet if observed in summer when under tillage, some days after a rain, and when other adjacent land looks dry on the surface, the part made calcareous will still show the moisture remaining, by its darker colour. All the effects from this power of calcareous manures may be observed within a few years after their application—though none of them strongly marked, as they are on lands made calcareous by nature, and in which time has aided and perfected the operation. These soils present great variety in their proportions of sand and clay—yet the most clayey is friable enough, and the most sandy firm enough, to be considered soils of good texture; and they resist the extremes of both wet and dry seasons, better than any other soils whatever. Time, and the increase of vegetable matter, will bring those qualities to the same perfection, in soils made calcareous by artificial means.

The subsequent gradual accumulation of vegetable matter in soils to which calcareous manures have been applied, must also aid the improvement of their texture and absorbing power. The vegetable matter also darkens the colour of the soil, which makes it warmer by more freely absorbing the rays of the sun.

Additional and practical proofs of all the powers of calcareous earth will be furnished, when its use and effects as manure will be stated. I flatter myself, however, that enough has already been said both to establish and account for the different capacities of soils for improvement by putrescent manures. If the power of fixing manures in soils has been correctly ascribed to calcareous earth, that alone is enough to show that soils containing that ingredient in sufficient quantity must become rich—and that aluminous and silicious earths mixed in any proportions, can never form other than a sterile soil.

A MODERN IRISH FARM.

Mr. P—— farms four hundred acres of land about his house ; and employs on this estate no less than a hundred and ten persons. He says there is full work for every one of them ; and to see the elaborate state of cultivation in which the land was, it is easy to understand how such an agricultural regiment were employed. The estate is like a well-ordered garden. We walked into a huge field of potatoes, and the landlord made us remark that there was not a single weed between the furrows ; and the whole formed a vast flower-bed of a score of acres. Every bit of land up to the hedge-side was fertilized and full of produce ; the space left for the plough having afterwards been gone over, and yielding its fullest proportion of “ fruit.” In a turnip-field were a score or more of women and children, who were marching through the ridges, removing the young plants where two or three had grown together, and leaving only the most healthy. Every individual root in the field was thus the object of culture ; and the owner said that this extreme cultivation answered his purpose, and that the employment of all these hands (the women and children earn 6d. and 8d. a-day all the year round), which gained him some reputation as a philanthropist, brought him profit as a farmer too ; for his crops were the best that land could produce. He has further the advantage of a large stock for manure, and does everything for the land which art can do. Here we saw several experiments in manuring. An acre of turnips prepared with bone-dust ; another with “ Murray’s Composition,” whereof I do not pretend to know the ingredients ; another with a new manure called guano. As far as turnips and a first-year’s crop went, the guano carried the day. The plants on the guano acre looked to be three weeks in advance of their neighbours, and were extremely plentiful and healthy. I went to see this field two months after the above passage was written ; the guano acre still kept the lead ; the bone-dust run guano very hard ; and composition was clearly distanced.

Behind the house is a fine village of corn and hay-ricks, and a street of out-buildings, where all the work of the farm is prepared. Here were numerous people coming with pails for buttermilk, which the good-natured landlord made over to them. A score of men or more were busied about the place ; some at a grindstone, others at a forge—other fellows busied in the cart-houses and stables, all of which were as neatly kept as in the best farm in England. A little further on was a flower-garden, a kitchen-garden, a hot-house just building, a kennel of fine pointers

and setters;—indeed a noble feature of country neatness, thrift and plenty.

We went into the cottages and gardens of several of Mr. P——'s labourers, which were all so neat, that I could not help fancying they were pet cottages erected under the landlord's own superintendence, and ornamented to his order. But he declared that it was not so; that the only benefit his labourers got from him was constant work, and a house rent-free; and that the neatness of the gardens and dwellings was of their own doing. By making them a present of the house, he said, he made them a present of the pig and live stock, with which almost every Irish cottar pays his rent, so that each workman could have a bit of meat for his support;—would that all labourers in the empire had as much! With regard to the neatness of the houses, the best way to ensure this, he said, was for the master constantly to visit them—to awaken as much emulation as he could amongst the cottagers, so that each should make his place as good as his neighbour's—and to take them good-humouredly to task if they failed in the requisite care.—*Titmarsh's Irish Sketch-book.*

ON THE CONDITION OF THE AGRICULTURAL LABOURERS.

By JOSHUA TRIMMER, F.G.S., &c.

Among the objects which the Royal Agricultural Society of England aim at accomplishing, the most important are—the general diffusion of superior modes of cultivation, which, although they have stood the test of long experience in certain districts, are, at present, almost exclusively confined to those districts—the application of science, more particularly of chemical science, to agriculture, and the improvement of the condition of the agricultural labourer. Their efforts have been most successful in the accomplishment of the first object. The erratic meetings of the society, in conjunction with the publication of their Journal, and the discussions of farmers' clubs, are contributing to the removal of that isolation in which the cultivators of the soil have too long remained, and, by leading them to think, to observe, and to read, are beginning to batter down local prejudices of long standing, and to clear the ground for the more general diffusion of the best existing systems of husbandry. In the second object, that of discovering new modes of cultivation, founded on a knowledge of the constituents of soils and of plants, of the

manner in which the vital functions of the latter are performed, and of the mode in which the different substances used as manures operate on the vegetable economy, the society has made but little progress, although much has been attempted by the individual members, in the way of experiment; and it may safely be predicted that little progress will be made, till a more precise and scientific mode of conducting experiments shall be adopted.

In improving the condition of the agricultural labourer little has been effected because little has been attempted. The third volume of the Journal is now nearly completed, and we find in the three volumes but two papers devoted to this subject: the one contains instructions for laying out cottage gardens, while the cottages are in too many cases destitute of gardens; the other consists of a collection of recipes for making savoury dishes for the labourer's table, many of which ought to have commenced, like that of the celebrated Mrs. Glasse, with—"First catch your hare." The possession of a cow by the agricultural labourer would be of far more value to him than all the recipes for stuffing a bullock's heart or making vinegar. This is the sum total of what the society have as yet done for the labourer, if we except the offer of a premium for an essay on the best construction of cottages, an object of paramount importance, as these pages will show, while £20, the amount of the sum thus proposed to be expended, offers as strong a contrast to the £900 a year distributed in prizes for sheep, oxen, and horses, as Falstaff's two-penceworth of bread to his enormous bill for sack. These remarks are made in no unfriendly spirit towards a society whose labours have already been productive of much good, in diffusing a knowledge of the practice of agriculture, and which has it in its power to raise the intellectual character of the farmers, thereby rendering them more ready to adopt improvements, and materially to improve the moral and physical condition of the labourer. They are rather intended to stimulate the members to exertion on the latter most important point; on which at present, they appear to have been remiss.

In this respect the English Society is far behind its predecessor in the march of agricultural improvement, the Highland Society of Scotland; though even that body has been reproached with directing too little attention to the welfare of the agricultural labourer.

"The next meeting of the Highland and Agricultural Society at Berwick," says Dr. Gilly, in his Appeal on Behalf of the Peasantry of the Border, "affords an opportunity of drawing attention, with more than ordinary hope of success, to the condition of the agricultural labourer, and of proposing some plan for the improvement of it. Many hundreds of

landlords and tenants, eminently distinguished for benevolence and intelligence, will shortly assemble together, from all parts of the kingdom, for the avowed purpose of receiving and communicating information on subjects connected with the advancement of agriculture as a science. They will offer, severally and collectively, their contributions of knowledge as to the best means of increasing the productiveness of the land, and of multiplying and perfecting implements of husbandry. Many of the arts and sciences—especially chemistry, geology, mechanics, and the experience and observations of our ablest philosophers, theorists, and experimentalists, in the use of them, will be brought to bear on the objects of the meeting. We shall hear of the beautiful state of perfection to which horses and sheep have been brought, by paying attention to their nature, wants, and habits. We shall hear of the means that have been resorted to for the purpose of improving live stock, so far as regards food, warmth, shelter, cleanliness, and prolongation of life; we shall hear of the premiums that have been awarded, and of all that has been done for draining and cleaning the land, for augmenting its produce, and for making it yield things of the best quality, and in the largest quantity. In fact, every thing, after its kind, which belongs to the cultivation of the land will be considered with a view to the great command, *Be fruitful and multiply*. That *MAN*, the first glorious object of creation, may have his due place in the deliberations of such an assembly; that the grand implement on which all depends—*man's hand*—may not seem to be disregarded; that the workman on whom the success of every improvement in agriculture depends; that the husbandman, the shepherd, and the herdsman, under whatever name or employment the agricultural labourers are designated; may have his interests consulted and his condition improved, amidst general competition in matters of agricultural reform, I venture to submit a few statistical facts for consideration.

“While some are directing their attention to the flora, the minerals, or the romantic localities of the Border District, and others to the better fabrication of various tools and implements, the construction of cow-byres, pig-sties, and sheep-folds, and to the irrational creatures that are to occupy them, I will follow the example which has been set by benevolent members of the society, and beg a few minutes' thought on behalf of the cottager and the tenement which is prepared for him, and of the provision which ought to be made for the culture of his mind, and for the advancement of his comforts as a moral and immortal being. Let us be doing for ‘right-minded man’ (to use Sir Robert Peel's term) in his cottage, as we have for the ox in his crib, or the horse in his

stable. Let us take care to lodge our peasants as well as we lodge our beasts." But, although amidst the march of agricultural improvement so little attention has been paid to the condition of the agricultural labourer, it is a subject of the utmost importance to the farmer and the landowner. How much more advantageous must they find it to their own interests—to put higher considerations out of the question—to be surrounded by a moral and religious, a frugal, industrious, and contented peasantry, looking up to their employers, and personally attached to them, than to live amidst a drunken, dissolute, and disaffected race of poachers, sheep-stealers, and rick-burners. That the former was once the character of the rural labourer, and that the latter description is now too generally applicable to those of the South of England, is a truth, to which, however inclined to do so, we cannot shut our eyes. It is true that, in after-dinner speeches at agricultural meetings, the superiority of the agricultural over the manufacturing portion of the labouring population is frequently proclaimed, and meets with loud applause; but follow the individuals who applaud these sentiments to their particular parishes, and you will find each of them declaring its inhabitants to be worse than those of others, and lamenting that they are surrounded by so "sad a set." That the condition as well as the character of farm-labourers has deteriorated within the last century—to whatever cause the deterioration is to be ascribed—few will have the hardihood to deny. That their physical condition is capable of great improvement, and that this exerts an important influence on their moral condition, the pages of Mr. Chadwick's report on the sanitary condition of the labouring classes testify too strongly. Those parts of the volume which relate to the sanitary state of towns—the influence of effective sewerage in improving the health of their poorer inhabitants, and raising the average duration of life among them to that which prevails among the higher classes of society—the value of the refuse which is now wasted, its capability of improving the rural districts, and the resources which it offers for the adoption of improved structural arrangements, the effects of land drainage, not only in increasing the produce of the soil, but in improving the health of both man and beast—all these afford matter of the highest interest to the agricultural reader; but the present article will be confined to the consideration of that part of the report which more immediately concerns the rural labourer.

The first facts to be noticed are the difference in the average duration of life among different classes of the community—the large proportion of the annual mortality which arises from diseases which experienced

medical men consider to be the most powerfully influenced by the physical circumstances under which the population is placed, such as the external and internal condition of their dwellings, as to drainage and ventilation, and the effects which the neglect of these has in reducing the average duration of life among the labouring classes. All the reports of medical men, as Mr. Chadwick has remarked, of relieving officers and assistant commissioners, would have failed to awaken attention to the havoc committed among the poor by diseases which admit of prevention, by proper sanitary measures, would have been regarded as exaggerated statements of a few extreme cases; but for the information afforded by the mortuary registers which show that the high rate of mortality among the labouring classes is general. A tabular return of the deaths and causes of mortality exhibits the following results as to the numbers who died, in England and Wales, during the years 1838 and 1839, of the four following classes of disease:—1, epidemic, endemic, and contagious; 2, diseases of the respiratory organs; 3, diseases of the brain and nerves; 4, diseases of the digestive organs.

1. Epidemic, endemic and contagious.		1838.	1839.
Fevers typhus and scarlatina.....	24,577	.....	25,991
Small pox	16,268	.....	9,131
Measles	6,114	.....	10,937
Hooping cough	9,107	.....	8,165
	56,466		54,224
2. Diseases of the respiratory organs.		1838.	1839.
Consumption	59,025	.....	59,559
Pneumonia	17,999	.....	18,151
All other classes.....	13,799	—90,823....	12,855—90,565
3. Diseases of the brain and nerves	49,704	.....	49,215
4. Diseases of the digestive organs.....	19,306	.....	20,767
Total deaths from the four preceding causes.....	216,299	.....	214,771
From all other causes of disease	66,641	}	77,065
From causes not specified	11,970		
From old age	35,564	.....	35,063
From violence	12,055	.....	11,980
	342,529		338,879

We see, then, that the deaths caused during one year in England and Wales, by epidemic, endemic, and contagious diseases, including typhus fever and scarlatina, amounted to 56,466, the greater portion of which are proved to be preventable. A slaughter, Mr. Chadwick observes, more than twice as great as that sustained by the allied armies in the Battle of Waterloo.

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The mortuary registers show that the number of deaths occurring in every thousand of the population, from the four classes of disease before specified, and from all causes of mortality, was as follows :—

	1838.	1839.
From the four classes of disease already specified..	14	14
From all causes of mortality.....	22	21

The variation of the proportions in different counties is curious. In the following table twelve agricultural counties are compared with the same number which are the seats of mines, manufactures, and large cities.

Agricultural Counties.	Deaths in every 1000 of the Population from the 4 classes of Disease.	Deaths in every 1000 of the Population from all causes of Mortality.	Counties the seats of Mines, Manufactures, and large Cities.	Deaths in every 1000 of the Population from the 4 classes of Disease.	Deaths in every 1000 of the Population from all causes of Mortality.
Bedford.....	13	22	Chester.....	14	21
Berks.	15	25	Cornwall	11	18
Cumberland.....	9	21	Derby	11	18
Devon	11	18	Durham	13	21
Dorset	11	19	Lancashire	18	25
Essex	11	19	Middlesex	20	27
Hereford	8	18	Nottingham.....	12	20
Leicester	9	17	Northampton	12	21
Norfolk.....	10	19	Stafford	12	18
Suffolk	12	20	Surrey	11	25
Sussex	11	18	Warwick	13	20
Wilts.....	12	20	York, West Riding	14	21
Average	11·00	19·10	Average	13·41	21·25

From this it appears that the average annual mortality is smaller in the agricultural than in the mining, manufacturing, and metropolitan districts. There is, however, little matter for congratulation in this fact, while the mortality from contagious diseases is as great in some of the purely agricultural, as in some of the manufacturing counties, and while, under the most favourable circumstances, the average duration of life among the rural labourers is less than among the higher and middle classes of towns, which we shall now show to be the case. It will be as well, however, first to explain the principles upon which tables of mortality are founded. They are of three kinds. Those which show the *average duration of life* are constructed thus. The total number of years found from the united ages of all the persons, men, women, and children, who have died in a year in a given district, divided by the number of deaths, gives the mean period of death. Such tables are considered the best tests of the condition and progress of an entire population. Tables of the *proportionate mortality* are formed by

dividing the total population by the number of deaths. Thus, out of a population of 223,054, if 7435 die in the year, a thirtieth of the population is annually swept away. Two communities, however, may have the same proportional mortality, and yet the average age of those who die may be very different, from the deaths occurring in one case chiefly at young ages, and hence, such returns, though generally used, are unsatisfactory indications of the sanitary condition of a population in different countries, or in the same country, at different times.

Tables of the *probabilities of life* at different ages, on which assurance companies act in fixing the rate of premium, are found by ascertaining the date of the birth of a given considerable number of individuals, 1000 for instance, and observing how many of them remain alive at the end of each year, in the different periods of life. The following table, constructed on the first principle, shows the average duration of life, founded by dividing the united ages of the parties dying by the number of deaths, in the following districts, selected by Mr. Chadwick for the purpose of ascertaining the comparative chances of life among different classes of the community in a variety of towns and rural districts:—

	Average Age of Deceased		
	Gentry and Professional Persons and their Families.	Farmers and Tradesmen and their Families.	Agricultural Labourers, Operatives, Servants, and their Families.
Bath	55	37	25
Truro	40	33	28
Derby	49	38	21
Unions of the county of Rutland	52	41	38
Unions of the county of Wilts	50	48	33
Kendal Union	45	39	34
Strand Union	43	33	24
Kensington Union	44	29	26
Whitechapel Union	45	27	22
Bethnal Green	45	26	16
Bolton Union	34	23	18
Leeds Borough	44	27	19
Liverpool	35	22	15
Manchester	38	20	17

The mortality in the county of Rutland exhibits that of a purely agricultural district, and so do the unions of the county of Wilts, as all deaths were excluded except those of persons described as agricultural labourers, farmers, and graziers, or gentry and professional persons resident in the rural districts. The Kendal union represents the mortality among a mixed agricultural, mining, and manufacturing population.

From the information thus obtained, it appears that persons in the higher grades of life—the gentry and professional persons—with their

families, attain a higher average age than the middle classes, and that among these, again, the chances of life are greater than among the labouring classes. It appears, also, that among all classes, a greater average age is, in general, attained by those living in the country than by the inhabitants of towns. The highest average age—38—of the labouring classes in a purely agricultural district—Rutlandshire—is the same as that of the highest class in Manchester, and greater than that of the highest class in Liverpool and Bolton. The lowest average duration of life among the labouring classes—15, 16, 17, and 18—is found in Liverpool, Bethnal Green, Manchester, and Bolton. A residence in towns, however, does not necessarily involve the curtailment of life; for the highest average period of death among the higher classes is at Bath, a population inhabiting large and airy houses, situated in spacious squares, broad streets, looking, almost invariably on one side or the other, upon parks and gardens or the open country; or placed on the brows of hills without any obstruction to the pure air of heaven. The situation of the tradesmen of Bath, also, though inferior to that of the gentry, is superior to the condition of those of their own class inhabiting other towns. In the most airy and improved districts of the metropolis, again, such as the Kensington and the Strand Unions, the average duration of life among the labouring classes is as great as that of the middle class in Whitechapel, Bethnal Green, Manchester, Liverpool, and Bolton. The causes which shorten life among the labouring population appear to be the ill-conditioned state of their dwellings, both internally and externally, as to drainage and ventilation, and want of proper ventilation in their places of work. In towns they suffer from both these noxious agencies; in the country they are affected only by the first. Mr. Chadwick's work affords satisfactory evidence, however, that when due attention is paid to the state of their dwellings and places of work, manufacturing labour is by no means unhealthy.

Since, in most situations, the chances of life are greater among the higher and middle classes, it might be supposed that this superior standard of health was the result of expensive modes of living; but the highest medical authorities agree in the opinion, that the best means of improving the health of the higher classes of society, and of extending the average duration of life among them, would be found in diminishing the quantity of stimulating food used by them; and, with respect to the labouring classes, there is abundant evidence to prove that high money-wages are far from conducing to health and longevity among them. Destitution has frequently been considered the predisposing cause of fever; but in the rural as well as the manufacturing districts, the attacks

of the disease fall chiefly on those in full employment. Fever precedes destitution, not destitution fever. When it attacks the higher classes, a larger proportion of the cases terminate fatally than among the lower ranks; a circumstance which medical men attribute to the more stimulating diet to which the former are accustomed. Cleanliness and temperance are found the best preservatives against disease, and there is too much reason to conclude that high money-wages do not tend to promote these among the labouring classes. Let us take a few instances from the Report: Mr. Harrison, the medical officer of the Preston Union, observes—"I have known many families whose income has exceeded £100 a year, who in times of sickness have been in great distress, and even some who have been obliged to have recourse to the parish for assistance. And I am acquainted with several families now, of the best paid class of work-people, whose total weekly earnings will average £2, and in some cases £3 a week, who, should sickness overtake the head of the family and some of the principal workers among the children, would be thrown upon the parish. I have been convinced from extensive observation, that the masters of these people have it in their power to improve the condition and happiness of their work-people beyond what can be effected by any other agency. Take also the following, out of a number of cases in which the earnings and condition of the parties in the receipt of good wages are contrasted with the state of others earning lower wages, but of different habits. These cases are given by Mr. Mott:—

John Salt, of Carr Bank, labourer, wages, 12s. per week: a wife, and one child aged 15. He is a drunken and disorderly fellow, and very much in debt.

Wm. Haynes, of Oakamore, wire drawer, wages £1 per week; he has a wife and five children. He is in debt, and his family shamefully neglected.

William Locket, of Kingsley, boatman, wages 18s. per week; wife and three children. He drunken and disorderly; his family entirely destitute.

Thomas Bartlem, of Tean, labourer, wages 14s. per week; wife earns 7s. per week; five children. He is very much in debt, and the home neglected.

John Hall, of Carr Bank, labourer, wages, 10s. per week; has reared ten children. He is in comfortable circumstances.

John Hammonds, of Woodhead, collier, wages 18s. per week; has six children to support. He is a steady man, and saving money.

Charles Rushton, of Lightwood-fields, wages 18s. per week. Supports a wife and five children in credit.

Wm. Box, of Tean, tape weaver, wages 18s. or 20s. per week. Supports his wife, in bad health, and five children.

It is the same in Scotland. Dr. Scott Alison, speaking of the condition of the colliers of Tranent, observes—"I have had occasion to

know, that medical men, judging from internal appearances of the dwellings of the labouring classes, are liable to be led into erroneous inferences as to the extent of destitution. The appearance of the place is no test of the want of means, or of the highness or lowness of wages. Filth is more frequently evidence of depravity than of destitution; indeed, in places where the wages and means are really scanty, there is very frequently considerable cleanliness. If a stranger went into the house of a collier, he might exclaim—'What extreme wretchedness and destitution'—when, in fact, on the Saturday they had received 30s., which, before the Tuesday, had all been squandered."

He thus contrasts the condition of the colliers with that of the agricultural labourers in the same neighbourhood.

"With very few exceptions the condition of the interior of the houses of the hind population is excellent, most pleasing to the eye, and comfortable. These respectable people, in spite of the defective construction of their cottages, contrive to throw an air of comfort, plenty, neatness, and order around their houses. I have often been delighted to observe these characteristics, and not less so to mark the co-existence of pure, moral, and religious principles, the presence of practical religion and practical morals. When the floor wears away it is repaired; when the walls lose their whiteness they are whitewashed; and every few days the whole of the wooden furniture in the house is subjected to thorough cleansing with sand and warm water. The various articles of furniture and the different household utensils are kept in places allotted to them, and the earthenware and china well cleaned and neatly arranged, and made to serve as ornaments to the apartment. The metal spoons, candlesticks, and pitchers for containing milk and water, are well burnished. The milk taken from the cow may be seen set apart in vessels kept in the nicest order; and beside them lie the churning barrel and strainer. A fire sheds its cheerful influence over the scene; the kettle never wants hot water, and the honest frugal housewife is ever discharging some household duty in a spirit of placid contentment; attending to her partner when present, or preparing his meals against his return from the fields. The external economy of the hinds' houses is, on the whole, very good. The ground in front of the cottages is kept clean, and free from impurities. The little garden, which is almost invariably connected with the cottage, is kept in good order, and in general well cultivated."

Mr. Wood, of Dundee, after contrasting the condition of families earning 10s. to 14s. per week, who are in comfortable circumstances, with that of others whose receipts amount from 15s. to 22s. a week, but

who, nevertheless, are insufficiently and poorly fed, and whose houses and persons are filthy, disorderly, and uncomfortable, remarks—"The statements just made make known the fact that, above a certain amount, say 12s. or 14s. weekly income, wages *alone*, without intelligence and good habits, contribute nothing towards the comfort, health, and independence of the working population. I am persuaded that the filth, fever, and destitution, in many families, is occasioned, not by their small incomes, but by a misapplication, or a prodigal waste, of a part, in some cases a great part, of their otherwise sufficient wages. Frequently cases are found, where, with a want of skill and economy, there is combined the intemperate use of intoxicating liquors; and here the misery may be said to be complete. Such is the explanation which I have to offer regarding much of the misery now prevalent, and it is the explanation invariably given by the economical working classes themselves, when questioned on the subject. Heads of families, having three or four children, whose incomes average from 14s. to 18s. per week, have assured me, that a man, with a wife and three or four children, can live comfortably on 12s. or 14s. a week; and they generally account for the misery and destitution existing among families, by saying, that many who have good wages, reduce themselves to poverty, and deprive themselves of sufficient food and clothing, by their mismanagement, want of frugality, and drinking practices."

Every one at all acquainted with the condition of the working classes of the South of England, even in the rural districts, must know that the above remarks are quite as applicable to them as to the poorer classes of Scotland. Intemperance is frequently assigned by the medical officers as the cause of disease. Mr. Chadwick is of opinion, that on carrying the investigation further back, the discomfort of their dwellings, arising from overcrowding, insufficient drainage and ventilation, will be found to be the antecedent of intemperance, of which he seems disposed to regard it as the cause. In this opinion we cannot wholly concur. The agricultural population of Tranent are described as living in cleanliness and frugality, comfort and sobriety, in spite of the defective structural arrangements of their cottages; and Dr. Gilly, in his Appeal on behalf of the Peasantry of the Border, gives an equally pleasing picture of the domestic economy of the hinds inhabiting dwellings of the following description. "Of the 83 tenements in Norham which have changed inhabitants within the last ten years, 54 are buildings deficient in all that is necessary to convenience and cleanliness, and yet the greater part are occupied by families who have done all they can to give them a decent and comfortable appearance. Some of them are mere hovels,

unfit for the peasantry of a civilized country, and threatening to tumble down about their ears. In many, human beings and cows are littered together under the same roof. Of the whole number, 174, which I am discussing, there are but 27 which have two rooms each, and which are supplied with that convenience which is indispensably necessary to cleanliness and decency. How often, when I have visited these hamlets and cottages, have I been surprised by the contrasts which they exhibited. To look at their exterior, you would suppose they were inhabited by a tribe of savages. Enter them, and you find an apartment amply supplied with household chattels, and smiling with content. The cottier and the housewife have done all for themselves which good management can devise."

Again he says—"The general character of the best of the old-fashioned hinds' cottages in the neighbourhood is bad, at the best. They have to bring everything with them—partitions, fixtures of all kinds, and substitutes for a ceiling; for they are, as I have already called them, mere sheds. They have no byre for their cow, no pumps or wells, nothing to promote cleanliness or comfort. The average size of these sheds is about 24 feet by 16. They are dark and unwholesome. The windows do not open, and many of them are not larger than 20 inches by 16. And into this space are crowded eight, ten, and even twelve persons. How they lie down to rest, how they sleep, how they can preserve common decency, how unutterable horrors are avoided is beyond all conception." Yet the following is his description of the interior of these cottages and of their inhabitants. "From the panelled beds which strike attention at first entrance, our eye rests on the dresser and shelves of pretty crockery-ware, which cover the greater part of another side of the room. Every hind's wife has an especial pride in exhibiting her collection of large blue dishes and plates, some of Staffordshire ware and others of delf, intermixed with old china, of a choice and rare pattern, which Queen Charlotte herself could have coveted. Then comes the handsome clock in its tall case, and the chest of drawers, sometimes of new wainscot, sometimes of an antique carved work (which, again, many a collector would like to lay his hands on), and which contains decent apparel for all the family, such as they take an honest pride in wearing on all proper occasions—and where have we a better-dressed population than among the northern peasants? The barrel of meal and the barrel of herrings occupy their place. The rack above displays some goodly fitches of bacon. White bread loaves we seldom see. The griddle cake, composed of barley and peas, and the oaten porridge and potatoes are the usual substitute for wheaten flour."

"Now as to the food for our peasant's mind. One book cannot escape our notice. It is the 'big ha' bible, ance his father's pride.' Few of our hinds are without a family bible with notes, and with it we remark one or two smaller bibles. The wish of good king George is realised, in this part of the kingdom at least, viz.—that every man in his dominions should have a bible, and that every child should be able to read it. Within the district which has come within my own observation, (and my enquires have been directed to this point) I do not know of one single hind's family which wants a bible, or of a child, who has reached seven years of age, who cannot read, except in some cases of imbecility. The prayer-book, some few other books of devotion and history, or of useful knowledge, are ranged by the side of the bible, and they all show that they have been frequently used."

If want of comfort in the structure and arrangements of their dwellings were productive of intemperance, filthy habits, and destitution, the hinds of Northumberland and Scotland ought to be a prey to drunkenness, dirt, disease, and misery; but the difference so strikingly set forth in the preceding extracts, between their habits and condition, and those of the collier and manufacturing population earning higher wages, and—it must in truth be added—of a large portion of the rural labourers of the south of England, can only be attributed to the different mode in which they receive payment for their labour. The payment of wages in kind and the possession of a cow, operate favourably upon the habits of the agricultural labourer of the north, by removing temptation to dissipate, at the beer-shop, the wages which ought to be applied to the maintenance of his family; by encouraging economy and fore-thought; and by rendering him independent of fluctuations of price, and also independent of the huckster's shop and the profits levied by intermediate dealers between his master as the producer and himself as the consumer. This mode of payment has been repeatedly urged, in the pages of this journal, as a protection to the pecuniary interests of the farmer during a depression of prices, as at present, and for the protection of the labourer during such an advance as we have repeatedly experienced of late. It is now insisted on for the favourable moral influence which it exercises on the habits of the rural population. It is much to be regretted that the peasantry of the Border should be provided with abodes so little worthy of the fine race of men who inhabit them; but the remonstrances of Dr. Gilly have drawn attention to the subject, and are inducing improvements. Those which some considerate landlords have effected have shown the necessity of efficient ventilation for the maintenance of health. The very defects of such huts as those described by Dr. Gilly were not

without advantage, in affording a passage for currents of air, which tended to counteract the effects of over-crowding and want of ventilation in generating febrile complaints; and their inhabitants were free from these, though subject to rheumatism. On the other hand, when improved habitations were provided, which effectually excluded the weather, but, from proper means of ventilation being neglected, afforded recesses for stagnating air, then impurities, which had been comparatively innoxious before, produced fevers, while rheumatic complaints disappeared.

The example of our gaols, and the improved sanatory state of the navy, prove how great an influence is exercised by a proper attention to cleanliness and ventilation, in conjunction with regular, though simple diet, in repressing disease, and extending the average duration of life. Before Howard attracted attention to the state of the prisons, they were notorious for their filth and want of ventilation, and the dreadful contagion which they generated. Not to mention the Black Assize at Oxford, in 1577, when a disease brought into court by the prisoners swept off the judge, the sheriff, and 300 more within 40 hours—which was only an extreme case of milder forms of disease, which were not of unfrequent occurrence; and not to mention the case which occurred during the Rebellion in Scotland, in which 200 men in one regiment were infected with the gaol fever, by some deserters brought from a prison in England. We find that at a more recent period one fleet sent to America lost 2000 men by fever imported from the gaols; it being the custom at that time, on the equipment of a squadron upon any sudden emergency, to empty the gaols in order to man it, and the mortality thus occasioned, was greater than from all other diseases or means of death put together. Through the exertions of Howard the condition of our prisons has been improved, and our criminal population are now by far more healthy than the independent labourer, even in the rural districts. For the purpose of ascertaining what had been effected by *sanatory regulations on the prison population*, the larger portion of which is taken from the worst regulated and most confined neighbourhoods, that is to say, what were the effects on persons living in the same atmosphere, upon a *less expensive* diet than that of the labouring population, but provided with clean and tolerably well-ventilated work and sleeping rooms, and under conditions which secured attention to personal cleanliness, Mr. Chadwick obtained returns of the number of days that the prisoners had been absent from work on the plea of ill health, in the prisons of Glasgow, Edinburgh, and Salford. The average cost of their diet, chiefly vegetable, being—at Salford, 1s. 4d. to 1s. 6d. each per week; at Edinburgh, 1s. 9d.; and at Glasgow 1s. 7d. This was found to be not only considerably

less than the average annual sickness among the population inhabiting the Wynds, or worst parts of Edinburgh, but below the average annual sickness of the labourers in the East India Company's warehouses—a select class of the cotton factories of Lancashire—of the members of benefit societies in Scotland, from returns collected by the Highland Society, which have been found to give results too favourable for general use in that country—and of the provident portion of the working classes throughout Great Britain, according to returns collected by Mr. Finlaison, actuary to the National Debt Office; and found to be low, as compared with the sickness occurring among the labouring classes in the Bethnal Green district.

The experience of sickness, as it is called, or the average number of days' sickness to each individual at the age of 40, was found to be—

Edinburgh Prison	2.75
Cotton factories of Lancashire.....	5.09
East India Company's labourers.....	5.15
Experience of the Benefit Societies of Scotland	6.09
Mr. Finlaison's Tables	9.02
In the Wynds of Edinburgh	15.10

Even in the Milbank Penitentiary, the situation of which is insalubrious, the average annual amount of sickness to the prisoners who are confined $2\frac{1}{2}$ years is only eight days, which, for the average ages, is little above the experience of the East India Company's labourers. The sickness among the metropolitan police is about $10\frac{1}{2}$ days per annum for each of the force; the sickness of the army is $14\frac{1}{2}$ days for each soldier; and Mr. Finlaison has declared, that were any benefit society to use scales for premiums founded on the prison experience, they would inevitably be insolvent in less than three years. The lower amounts of sickness, under proper sanatory care, which these returns exhibit, show the extent to which it is possible, by removing the causes of disease, to raise the health of our labouring population. How long shall they be exposed to disease that is preventible, and from which our criminals are exempt? And be it remembered, that though the sanatory condition of our rural labourers is better than that of the other working classes inhabiting towns, it is still far below that of the middle and higher ranks of society.

The naval medical service has furnished another example of the efficacy of preventive measures in warding off the attacks of disease. Diseases such as now prevail upon the land, did, within the experience of persons now living, prevail to a frightful extent in our ships of war, in which the deaths from disease were more than double the number of

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those from accidents and in battle. A few instances will suffice to show the ravages committed in the navy by disease, about a century ago. When Admiral Hosier sailed to the West Indies, in 1726, with seven ships, he buried their crews twice, and died himself of a broken heart. The ravages of the scurvy in Lord Anson's fleet, in 1740-44, are well known to all who have read his voyage. Exactly a century ago the *Centurion* lost, in a few weeks, 200 out of 400 men by that disease. As a contrast to this, under better sanatory management, the whole British squadron in South America lost, by diseases of every description, only 115 men out of 17,250, between the years 1830 and 1836. The following statement shows the progressive improvement in the health of the navy. In 1779 the proportion of deaths to the number employed was one in eight; in 1811 it was reduced to one in thirty-two; and from 1830 to 1836 the average annual proportion of deaths was one in seventy-two of the employed. This calculation includes deaths from wounds, drowning, and all external causes, as well as disease.

From the latter cause, the deaths were one in eighty-five of the employed. This applies to the whole service, and includes the most unhealthy stations, viz., the coast of Africa and the West Indies. The mortality of the home-force ships, chiefly employed in harbour duty, and therefore not cut off from communication with infection from the shore, furnishes the standard to which the rate of mortality might be reduced among a male population on shore ranging from 15 to 50 years of age. In the period between 1830 and 1836 the deaths in the navy, from disease alone, excluding those from external causes, were as under:—

	<i>Disease, per 1000.</i>	<i>All Causes, per 1000.</i>
1830	6.0	8.7
1831	11.5	13.4
1832	11.9	14.0
1833	6.3	7.9
1834	4.9	6.7
1835	5.9	7.2
1836	7.5	9.5

The deaths on shore, according to Mr. Finlaison, among a population 29 years of age, may be estimated at 12 in the 1000 annually. The deaths of the same age in Essex and Rutland, according to Mr. Rickman, would be about $12\frac{1}{2}$ in the 1000 per annum; in the metropolis they are about $15\frac{1}{2}$; in the government dock-yards they are 15. "Cases of epidemics, such as typhus and scarlatina, affecting large groups of the army," Mr. Chadwick observes, "are now scarcely known,

and their occurrence would indicate to the chiefs of the army medical board the occurrence of some great neglect demanding inquiry."

We will now turn to the reports of the medical officers and others employed in the investigation of the sanatory state of the labouring classes, as to the external and internal condition of their dwellings, confining our attention to those of the rural population, in order to see how they accord with the conditions necessary to produce a high standard of health, namely, cleanliness, efficient drainage (without which, cleanliness cannot well exist), and ventilation.

DORSET.

"The fatal case of typhus," says the medical officer of the Cerne Union, "occurred in a very small village containing about sixty inhabitants, and, from its locality, it appears favourable to the production of typhus, synochus, and acute rheumatism. It stands between two hills, with a river running through it, and is occasionally flooded. It has extensive water meadows, both above and below, and a farm-yard in the centre, where there is always a large quantity of vegetable matter undergoing decomposition. Most of the cases of synochus occurred under cases favourable to its production. Most of the cottages being of the worst description, some mere mud hovels, and situated in low and damp places, with cess-pools or accumulations of filth close to the doors. The *mud floors* of many are much below the level of the road, and, in wet seasons, are little better than so much clay. * * * In many of the cottages, also, where synochus prevailed, the beds stood on the ground floor, which was damp three parts of the year, scarcely one had a fire-place in the bed-room, and one had a single pane of small glass stuck in the mud wall as its only window, with a large heap of wet and dirty potatoes in one corner. Persons living in such cottages are generally very poor, very dirty, and usually in rags, living almost wholly on bread and potatoes, scarcely ever tasting animal food, and consequently highly susceptible of disease, and very unable to contend with it. I am quite sure, if such persons were placed in good, comfortable, clean cottages, the improvement in themselves and children would soon be visible; and the exceptions would only be found in a few of the poorest and most wretched, who had been born in a mud hovel, and perhaps had lived in one the first 30 years of their lives. In my district, I do not think there is one cottage to be found consisting of a day-room, three bed-rooms, scullery, pantry, and convenient receptacles for refuse and fuel, in the occupation of a labourer; but there are many consisting of a day-room and two bed-rooms, constructed

with a due regard to ventilation and warmth, pantry and fuel-house, with a small garden and pig-stye adjoining, and the labourers inhabiting such cottages are, in general, far superior to others less advantageously situated. Their persons and cottages are always neater and cleaner, they are less disposed to frequent the beer-shop, or to engage in poaching, whilst their children are generally sent daily to some school, in many instances supported chiefly by the clergyman of the parish."

SOMERSET.

The medical officer of the Axbridge Union, after describing the diet and disease and overcrowding of the inferior abodes of the poor in his district, observes—"There is a class of persons called the 'second poor,' who, for the most part, are constantly employed throughout the year as farmers' labourers, and who are in much better circumstances than those to whom I have alluded. They have much better cottage accommodation, their houses being provided with one, sometimes two day-rooms, two bed-rooms, a pantry, and other accommodations for fuel and refuse, and whose general health and condition is much better than those less advantageously situated."

WILTS.

The medical officer of the Chippenham Union thus describes the condition of a rural village, having apparently the most advantageous site:—

"The parish of Coleine, which, upon a cursory view, any person unacquainted with its peculiarities would pronounce to be the most healthy village in England, is, in fact, one of the most unhealthy. From its commanding position, situated upon a high hill, it has an appearance of health and cheerfulness which delight the eye of the traveller, who commands a view of it from the Great Western Road, but this impression is immediately removed on entering at any point of the town. The fifth, the dilapidated buildings, the squalid appearance of the majority of the lower orders, have a sickening effect upon the stranger who first visits this place. During three years' attendance upon the poor of this district I have never known the small-pox, scarlatina, or typhus fever absent. The situation is damp and the buildings unhealthy, and the inhabitants themselves inclined to be of dirty habits. There is also a great want of drainage."

BEDFORDSHIRE.

The medical officers of the Bedford, Woburn, and Ampthill Unions, report as follows:—

Bedford Union.

"Throughout the whole of this district there is a great want of superior cottage accommodation, most of the residences of the labourers are thickly inhabited, and many of them damp, low, cold, smoky, and comfortless. These circumstances occasion the inmates to be sickly in the winter season, but I have not observed them to generate typhus, the prevailing form of disease being principally catarrhal, such as colds, coughs, inflammation of the eyes, dysentery, rheumatism, &c. However, when any contagious or epidemic malaria occurs, the cases are generally more numerous."

Toddington, in the Woburn Union.

"In this town fever prevailed during the last year, and, from the state of the dwellings of the persons I called on, this could not be wondered at. Very few of the cottages were furnished with privies that could be used, and contiguous to almost every door a dung-heap was raised, on which every species of filth was accumulated, either for the purpose of being used in the garden allotments of the cottages, or to be disposed of for manure. Scarcely any cottage was provided with a pantry, and I found the provisions generally kept in the bed-rooms. In several instances I found whole families, comprising adults and infant children, with their parents, sleeping in one room."

Amphill Union.

"The cottages in which typhus fever first appeared, and to which it has been almost exclusively confined, are of the most wretched description. A stagnant pond is in the immediate vicinity, and none of the tenements have drains; rubbish is thrown within a few yards of the dwelling, and there is no doubt but in damp foggy weather, and also during the heat of summer, the exhalations arising from those heaps of filth must generate disease; and the noxious effluvia tends to spread contagion wherever it already exists. It appears that most of the cottages alluded to were built for election purposes, and have since been allowed to decay; the roofs are repaired with turf, dug in the neighbourhood, and the walls repaired with prepared clay, without the addition of lime-washing. Contagious disease has not been remarkable within the union in any other spot than the one alluded to."

Leighton Buzzard Union.

"There are a number of cottages without sleeping-rooms separate from the day-rooms, and frequently three or four families are found occupy-

ing the same bed-room, and young men and women promiscuously sleeping in the same apartment."

The following are the reports of the medical officers from—

HERTS AND ESSEX.—Bishop Stortford Union.

"We have always found the smallest and most slightly-built houses the seats of the lowest forms of disease; and, although during the last year no epidemic or infectious disease here prevailed, it is but just to state that, generally speaking, the cottages of labourers in this district are small, badly protected from both extremes of weather, badly drained, and low in the ground."

Epping Union.

"The state of some of the dwellings of the poor is most deplorable as regards their health, and also in a moral point of view. As it relates to the former, many of their cottages are neither wind-tight nor water-tight. It has fallen to my lot to be called in to attend a labour, where the wet has been running down the walls, and light to be distinguished through the roof, and this in the winter season, with no fire-place in the room. As it relates to the latter, in my opinion a want of accommodation for bed-rooms often occurs, so that you may frequently find the father, mother, and children all sleeping in the same apartment, and, in some instances, the children having attained the age of 16 or 17 years, and of both sexes: and if a death occurs in the house, let the person die of the most contagious disease, they must either sleep in the same room or take repose in the room they live in, which most frequently has a stone or brick floor, which must be prejudicial to health."

Bromley Union.

"My attention was first directed to the sources of malaria in this district and neighbourhood, when cholera became epidemic. I then partially examined the dwellings of the poor, and have recently completed the survey. It is almost incredible that so many sources of malaria should exist in a rural district. A total absence of all provision for effectual drainage round cottages is a most prominent source of malaria; throughout the whole district there is scarcely an attempt at it. The refuse vegetable and animal matters are also thrown by the cottagers in heaps near their dwellings to decompose, and sometimes not removed except at very long intervals, and are always permitted to remain sufficiently long to accumulate in some quantity; pig-sties are generally near the dwellings, and are always surrounded by heaps of decomposing animal and vegetable matter. These constitute some of

the many sources of malaria, and peculiarly deserve attention, as being easily remedied, and yet, as it were cherished. The effects of malaria are strikingly exemplified in parts of this district. There are localities from which fever is seldom long absent, and I find spots where the spasmodic cholera located itself are also the chosen resorts of continued fever."

OXFORDSHIRE.—*Bicester Union.*

"The residences of the poor, in that part of the district, are most wretched, the majority consisting of only one room below, and one above, in which all the family of eight or ten (upon an average I should say five) sleep. In one of these rooms I have witnessed a father, mother, three grown-up sons, a daughter and a child, lying at the same time with a typhus fever: but few of the adjacent residents escaped the infection."

HANTS.—*Romsey Union.*

"There is not only a great want of cottages, but also of room in those which now stand. In the parish of Mottisfont, I have known 14 individuals of one family together in a small room, the mother being in labour at the time, and in the adjoining room seven other persons sleeping, making 21 persons in a space which should be occupied by six persons only at most. Here are the young woman and young man of 18 or 20 years of age lying alongside of the father and mother, and the latter actually in labour. It will be asked, what is the condition of the inmates? Just such as might be expected."

These extracts will suffice to give an idea of the too common condition of the habitations of the labouring classes in the rural districts, and of the effects which it must produce upon their health and morals,

Let us now view the preventible disease, arising from these causes, in the light in which Mr. Chadwick is very fond of placing it, namely, with regard to pecuniary burthens arising from the neglect of sanatory measures.

Putting out of the question the loss to the community of the productive power of the labourer, by sickness and the reduced duration of life and ability to labour, and putting, also, out of the question, for the present, the cost of his maintenance, during the preventible sickness, let us first consider the burthens created by premature widowhood and orphanage.

In order to form an estimate of the extent to which such burthens are cast upon the poors' rate, Mr. Chadwick endeavoured to ascertain

the average age at which death befell the heads of families of children, who, with their mothers, had been relieved on the ground of destitution, in eight of the unions where the average age of mortality prevalent among different classes of the community has been ascertained, and from the data thus obtained he calculates that if the same rule obtains in all the other unions, then out of 43,000 cases of widowhood and 112,000 of orphan children, chargeable on the poor-rates for the year ending Lady-day 1840, there would be 27,000 widows whose husbands died under the age of 45, which is 13 years below the natural probabilities of life, as shown by the experience of the whole population of Sweden—the Swedish tables being frequently applied to the insurance of the lives of the labouring classes in this country—and that these 27,000 deaths must have thrown upon the parish funds 100,000 orphans.

The expense of these widows and children to their parishes at the usual allowance of three shillings per week to the woman and one shilling a week for each of the children, excepting one, cannot be estimated at less than £400,000 annually; but the evil does not end here. “This premature widowhood”—Mr. Chadwick observes—“is the source of the most painful description of pauperism, and the most difficult to deal with; it is the source of a constant influx of the independent, into the permanently dependent classes. The widow, where there are children, generally remains a permanent charge; re-marriages amongst those who have children are very rare; in some unions they do not exceed one case in twenty or thirty. By the time the children are fit for labour, and cease to require the parent’s attention, the mothers frequently become unfit for earning their own livelihood, or habituated to dependence, and without care to emerge from it. Even where the children are, by good training and education, fitted for productive industry, when they marry, the early familiarity with parochial relief makes them improvident, and they fall back upon the poors’ rates on the lying-in of their wives, on their sickness, and for aid on every emergency. In every district the poors’ rolls form the pedigrees of generations of families thus pauperised.”

Let us now look at the expense of the maintenance of the labouring classes during preventible sickness, and we shall find that the saving which might be effected in this respect, would afford to them the means of paying for superior cottage accommodation which would raise the standard of health among them. Take, for instance, the case put by Mr. Chadwick, of a family consisting of the man aged 40, his wife 30, and two children, who may be regarded as equal to one child aged 15, the lowest age estimated in Mr. Finlaison’s tables for the guidance of

benefit societies. To insure 10s. a-week to each member of such a family during sickness, the premium would be 6s. 1½d. monthly, equal to £3 13s. 9d. a-year, to which may be added 5s. or 6s. for medical attendance, that being the usual rate of insurance by medical clubs. Now, if, by a diminution of the probabilities of sickness to one-half their present amount, the present charges for insurance could be reduced one-half, the provident labourer having such a family might secure medical attendance and 10s. a-week for each member of it during sickness for £1 9s. 10½d. a-year less than he now pays; and this would place at his disposal so much to pay the increased rent consequent on improvements in the internal and external structural arrangements of his dwelling.

In the case of the improvident labourers who, under cases of sickness and premature death, would entail burthens on the parochial funds, inasmuch as an increase of those rates would diminish the value of the land, the landowner, who should provide the labourers on his estate with superior cottage accommodation at the same rate as that paid by them for their present incommodious and insalubrious dwellings, would, in effect, merely be paying a premium of insurance against the cost of their maintenance during preventible sickness, and of the maintenance of their families during premature and preventible orphanage. That such a reduction of the premium of insurance against sickness to one-half of its present amount is practicable, under proper preventive measures, is evident, from the fact that, according to the experience on which Mr. Finlaison's tables are founded, the average annual sickness of all the members of such a family would amount to 20·71 days; whereas in the Edinburgh Prison, in which the sickness was higher than in the others from which returns were furnished, the amount of their average annual sickness would only have been 5·02 days.

But the labourer has frequently been paying for inferior accommodation at a rate which should ensure the necessary comforts in his dwelling. In the numerous local reports which Mr. Chadwick examined, one point, he says, is adverted to under a great variety of circumstances—viz., that the former parochial administration has had an injurious effect, in degrading the habitations of the labouring classes and checking improvement. This has been brought about by the facilities afforded to the owners of cottage property, in their capacity of administrators of the poors' rates, to procure for their own property exemption from rates, on the plea of the destitution of the inhabitants and inability to pay; but, as the occupation of a cottage presenting an

appearance above the average would have been regarded by others as evidence of ability to pay rates, it was clearly the interest of the proprietor, who in most cases increased his rent by the amount of rates supposed to be remitted, not to improve its condition; for the general tenor of the evidence is, that such cottages were of a very inferior description; that the rents paid for them were exorbitant, and such as would be sufficient to ensure accommodation of a better description.

The system of parish cottages, in which the inmates lived rent-free, also excited a depressing influence on the condition of the labourers' dwellings. Such cottages were generally in a filthy and dilapidated state, of which the occupants did not dare to complain, because they held them by sufferance. On the sale of such tenements by the Poor-law Commissioners, it has been found that money has been expended by the purchasers in putting them in good and tenantable repair, which is an argument that the class for whose reception they were intended possessed the means of paying for better accommodation; for, without the probability of a return such an outlay would not have taken place. It has likewise been proved that the payment of rents out of the poor's-rate, under the old administration, operated injuriously for the independent labourer; for the discontinuance of the practice in some districts in which it had prevailed to a great extent—some of the Shropshire Unions, for instance—has produced a reduction of about 15 per cent in the rent of labourers' cottages. It may, therefore, be presumed, that the labouring classes possess the means of obtaining the comforts of superior dwellings, and also that they are not benefited by exemptions from the charges necessary to procure them; and we will now proceed to consider by what parties such superior accommodation is to be provided. Improvement will rarely, if ever, originate with those for whose immediate benefit it is required. Too frequently the labourer has been rendered, by existing habits, incapable of perceiving the advantage of a change, and indifferent to the use of means of improvement. The sense of smell, which, to others not accustomed to the tainted atmosphere which he breathes, gives warning of the presence of malaria, in him appears to be obliterated; he is, at all events, more sensitive of cold, and will endure almost any stench for the sake of warmth. If he perceives the advantage of improved structural arrangements, he has little or no control over the internal or external economy of his dwelling; if unprovided with water or receptacles for refuse, though he may be aware of the advantages of such improvements, he has not the power to procure them, and he has still less control over the drainage around

his dwelling and the state of the approaches to it. In the neighbourhood of manufacturing towns, and in some rural districts, better constructed houses have been provided for the labouring classes, and the extent to which these are sought—though in many cases the additional space is abused to the purpose of subdividing them, or over-crowding them with lodgers—shows an increasing disposition among them to avail themselves of the benefit of such improvements. But, in general, spontaneous improvement will not originate with them, even when in the receipt of high wages. In manufacturing towns, the cottages erected by building clubs and building speculators of the class of workmen are the least substantial and the most destitute of proper accommodation; and in the rural districts, the worst of the new cottages are those erected on the borders of commons by the labourers for themselves. When the Highland Society offered prizes for the best constructed cottages and premiums for the best plans, competition being open to all parties, they obtained none from the labouring classes, and only succeeded by the interest which they excited among the proprietors, and the improvements which were effected through their exertions. It is only the dwellings erected by wealthy manufacturers for their own workmen, and those built by benevolent and enlightened landowners in the rural districts for the labourers on their own estates, that examples are to be found of improved residences. The state of the hinds' cottages in the most highly cultivated districts of Northumberland and Scotland, as well as in some of the most improved districts of the South of England, shows that the farmers are as indifferent on this important subject of the labourer's dwelling as the labourer himself; and that it is only from the landed proprietors that improvements are to be expected.

While, therefore, we urge on the farmer the hiring of his labourers as much as possible by the year, and the payment of their wages for the most part in kind, for his own benefit as well as theirs, we urge upon the landlords the necessity of providing every farm upon their estates with a suitable number of cottages for these permanent labourers; not crowded in villages, nor banished out of sight in lanes and bye-ways, but situated upon the farm which the inmates are to cultivate, and having a garden containing a quarter of an acre of land attached to each. Three of these to every hundred acres will, in most cases, be sufficient, and they should be arranged in groups of three or four together, in some conspicuous situation, not far removed from the dwelling of the farmer, and so placed as to be frequently under his eye. At a

trifling cost, judiciously applied, they may be made an ornament rather than an eyesore.

It has been found that the connection of the labourer's dwelling with his employment, whether in a manufactory or upon the farm, is mutually advantageous both to the employer and the employed. The labourer gains by proximity to his work, by escaping exposure to wet and cold, together with unnecessary fatigue in traversing considerable distances early in the morning and at night-fall; and when he resides near his place of work he is enabled to take his dinner with his family, instead of under a hedge or in the beer-shop. His family, likewise, are gainers by the incentives to neatness, cleanliness, and propriety of conduct, from their proximity to the family of their employer, and from being known to them, and under their observation. The labourer generally gains, likewise, from stability of employment, arising out of the connection. He gains, also, by the expenditure which takes place for the external appearance of his dwelling, when known to form part of the property; for the rank which it holds, and its external appearance, exercise some influence on the inhabitants, by increasing their self-respect and pride in the decencies of life.

To the employer, the benefits consist in the improved moral condition of his labourers, and their greater capability of work. The latter is most evident in large manufactories, where, from the great numbers employed, a small additional quantity of work performed by each during the week, amounts, in the year, to a considerable sum. The saving arising from attention to the comforts of the workmen is strikingly exemplified in the case of the works of Mr. Smith of Deanston, the inventor of the system of frequent drains and of subsoil-ploughing, who carries on an extensive cotton and machine-making manufactory near Stirling. Having incurred a considerable expense in introducing into it improved structural arrangements, beneficial to the health of the work-people, he is confident that they have been no less favorable to his own interests, in the various economical advantages which they possessed—"The improvements of the place of work was combined with improvements in the residences of the work-people. About one-half of the hands employed in the mill resided in houses near the works, which were well drained. The ashes and other refuse were cleared away every morning, between 6 and 7, and carried to a general dung-stead at a distance, for the use of their gardens. On enquiry into the state of the health of the work-people living in these improved tenements, it appeared that they had not one-half of the sickness experienced by the rest

of the work-people who lived in common ill-regulated houses, about a mile distant. The whole of the population had fewer diseases than any other class of the population in the surrounding country; they presented fewer cases of rheumatism, and there were scarcely any lung diseases among them. Their general health was decidedly better than that of the adjacent agricultural population. * * * The improved health of the work-people was attended with more energy and better labour; by less of lassitude, of waste from relaxed exertion, by fewer interruptions from sickness, and fewer spare hands to insure the completion of work. * * * Mr. Smith had long considered that it was in the power of the masters of Britain entirely to extirpate excessive and habitual drinking. "We never," said he, "suffer a man to come near the work who is in the slightest degree intoxicated, and never permit any one to be absent one day drinking. You never can be well or cheaply served by a dissipated workman. The most skilful workman, the man whose services I can the least spare, if he takes to drinking, leaves the place. It may occasion immediate inconvenience, and even immediate loss, but if the rule be steadily applied, it will contribute to the comfort and profit of the master as well as of the man."

Another instance of the profit as well as humanity of that benevolent foresight which economizes the strength and life of workmen is afforded by the case of the great copper mine of Tresavean in Gwennap, where it is calculated that the sum of £2000, expended in substituting machinery for raising and lowering the workmen for the ladders in general use, will soon be repaid by the saving of the time of the men. The gain in these cases is more striking from the great numbers employed, but, though less apparent, it is not less real upon the farm.

With respect to the improvement which is effected in the condition of the agricultural labourer by the possession of greater comfort in his dwelling, we find the chairman of the Bedford Union declaring his experience of the benefits which have resulted from it. These he attributes, in a great measure, to the parties feeling themselves somewhat elevated in the scale of society, by having a better cottage and garden, whereby they have been stimulated to industry, and, rising in respectability, become aware that they have a character to lose. This point gained, they become anxious to retain these advantages, and to maintain their independence; become members of benefit societies and medical and clothing clubs, and frequently invest something quarterly or yearly in the savings' bank. As an addition to these advantages, it is stated, that the children are sent regularly for instruction to Sunday schools,

and, when possible, to day schools; and the whole family become more regular in their attendance on some place of worship.

Mr. Fairburn, a large manufacturer of Manchester, has the following testimony respecting the influence of the employer in promoting respectability of personal appearance, and the importance of this as an indication of character:—

“It is always an indication of looseness of character and a low standard of moral conduct to see a mechanic in dirt or in his working clothes on Sunday. Thirty years’ experience leads me to draw a very unfavourable conclusion as to the future usefulness to me, and of success to himself, of any workman whom I see in dirt on Sunday. * * * Better personal condition leads to better associates, and commonly to better marriage, on which the improved condition of the house is entirely dependent. * * * I am a strong advocate for dress, and encourage the working men to dress well. If I see any workman in a dirty condition in the streets on the Sunday, I do not perhaps speak to him then, but on the Monday I tell him I have been looking over the books, and I find that he has had as good wages as other men who dress respectably, and that I do not like to have any one about me who will not dress well on the Sunday. This intimation has generally had the desired effect.”

But to return to the statements of the chairman of the Bedford Union. “I know,” he adds, “of more instances than one, where, in consequence of encouragement, of the kind mentioned, to the father of a poor family, the children were regularly sent to school, and there became so much improved in character and learning that they are now filling stations of high respectability (one a confidential clerk in a large mercantile house in London), and are assisting to support their parents in a manner as delightful as it is creditable.

“A man who comes home to a poor comfortless hovel, after his day’s labour, finds his spirits more often depressed than excited by it. He feels that, do his best, he shall be miserable still, and is too apt to fly to the alehouse. But give him the means of making himself comfortable by his own industry, and I am convinced by experience, that in many cases he will avail himself of it.”

So also the clerk to the Stafford Union, after describing labourers’ cottages of the same character as those described in the reports of the medical officers, from which we have given extracts, says—“The husband, enjoying little comfort under his roof, resorts to the beer-shop, neglects the cultivation of his garden, and impoverishes his family. The children are brought up without regard to any decency of behaviour,

habits of fore-sight, or self-restraint. The girls become the mothers of bastards, and return home a burthen to their parents or the parish, or fill the workhouse. The boys spend the Christmas holidays and their year's wages in the beer-shop, and enter upon their new situations in rags. Soon tired of the restraint imposed upon them under the roof of a master, they leave his service before the termination of the year's engagement, and seek employment as day-labourers, not with a view of improving their condition, but with a desire to receive and spend their earnings weekly in the beer-shop; associating with the worst of characters, they become the worst of labourers, resort to poaching, commit petty thefts, and add to the county rates by commitments and prosecutions. On the contrary, on entering an improved cottage, consisting, on the ground floor, of a room for the family, a wash-house and pantry, and three sleeping-rooms over, with a neat and well-cultivated garden, in which the leisure hours of the husband being both pleasantly and profitably employed, he has no desire to frequent the beer-shop, or spend his evenings from home; the children are trained to labour, to habits and feelings of independence, and taught to connect happiness with industry, and to shrink from idleness and immorality; the girls make good servants, obtain the confidence of their employers, and get promoted to the best situations. The boys, at the termination of the year's engagements, spend the Christmas week's holidays comfortably under the roof of their parents; clothes suitable for the next year's service are provided, and the residue of the wages is deposited in the savings' bank; a system of frugality is engrafted with the first deposit, increasing with every addition to the fund; they are gradually employed in those departments of labour requiring greater skill and implying more confidence in their integrity and industry, and they attain a position in society of comparative independence. I have selected an extreme case, to show, more fully, the advantage derived from improved cottages, and the immoral effects of inferior dwellings, unfortunately too numerous in this union."

Here for the present we conclude, recommending, not the perusal only, but the study of Mr. Chadwick's valuable report to every landlord and every employer of workmen, whether upon the land or in the factory, as affording the strongest proofs of the power which they possess of advancing the physical and moral improvement of the labouring classes; and of the benefit which they will at the same time confer upon their own interests. On some future occasion the subject will be resumed; the details of the cost and specifications of the best plans for labourers' cottages will be discussed; a scale of wages in

kind, adapted to the habits of the Southern peasantry, will be proposed: and objections answered, as to the impracticability alleged by some, of making the keep of a cow a portion of those wages, except in districts where rough pasture abounds.

May, 1843.

THE WEEDS OF AGRICULTURE.

A small tract on this subject was sketched by the late B. Holditch, Esq., Editor of the *Farmer's Journal*, and completed by the late Mr. G. Sinclair, F.L.S., &c. Since the death of Mr. Sinclair, an 8vo. edition of his celebrated *Hortus Gramineus Woburnensis* has been lately published by the proprietors, Messrs. Ridgway, 169, Piccadilly, London, to which the "*Weeds of Agriculture*" has been appended.

Both of the above-named authors strongly recommended to young farmers a knowledge of the weeds which encumber or rob their crops, or which, when carried to the barn, deteriorate their samples of grain when presented at market. Mr. Sinclair remarks that the world is always in a state of pupillage; some are learning what others know; and, while the latter offer advice, the former should avail themselves of whatever falls from their seniors in the art in which both are engaged.

Notwithstanding the original tract contained a good deal of useful information, and which it behoves every farmer to know, yet the subject is by no means exhausted; for though certain corrections and additions appeared in the last edition, they are not so generally known perhaps as they should be. I shall therefore turn over the tract, name the most noxious weeds, and detail the means recommended for their extirpation.

Mr. Holditch treated of farm-weeds under the several heads:—1st, of weeds which infest samples of corn; 2, fallow weeds; 3, annual or surface-weeds; and 4, pasture-weeds.

In his first section he includes darnel, drank, cockle, tares, melilot, wild-oats, harriff or burre, crow-needles, black bind-weed, snake-weed, charlock, &c.

1. The first, namely darnel, the *lolium temulentum* of botanists, is a most detestable plant among wheat or rye; for if sown, reaped, thrashed, and ground therewith into flour and made into bread, renders it not only unpalatable and unwholesome, but actually poisonous. Luckily, darnel is not very common; in form it is very like the common ray-grass, *lolium perenne*, only thrice the size. The seeds are large, and nearly the size of the smaller grains of wheat; they are also equally heavy: and

therefore cannot be separated by the usual means. Neither birds nor beasts choose this plant as food, it being excessively bitter. The only means of getting rid of it is by rejecting all wheat intended for seed in which darnel-seed appears, and enjoining a duty upon the reapers and barn-men to collect it in bundles for the fire for a small gratuity.

2. Drank is the *bromus secalinus*, another biennial grass more frequently seen among wheat than darnel, though often seen together. The habit of this plant is however very different; for instead of a long spike of seeds, it has a much divided nodding panicle bearing numerous heavy seeds, less than those of darnel, but as plump as canary-grass seed. The seeds taste like oats, and are equally eaten by all animals. The millers call the seeds *ray* when among wheat, and though they object to its presence, they know that it never injures the quality of the flour. It is very conspicuous at harvest, and may be easily collected by hand.

3. Cockle. This plant is universally known among botanists as the *agrostemma githago*, and to everybody about a farm for the beauty of its pale purple flowers. It is an annual, and is chiefly found among barley, and if cut and carried to the barn or rick, when thrashed, the numerous black seeds of the cockle are very visible, and lower the value of the sample in the estimation of the maltster. Barley intended for seed or sale may easily be freed from these seeds by a properly-constructed wire sieve, which will allow the seeds to pass, and keep back the barley.

4. Hariff, otherwise called cleavers or goose-grass—and the seeds are called burrs—is the *galium aparine*, a common weed everywhere, especially on light land. It is a smothering plant among corn, and when thrashed therewith, its seeds are difficult to be cleared out. The easiest mode of collecting the seeds to be burnt is by covering the corn-screen with a piece of baize, and trundling the grain over it; most of the burrs will adhere to the baize, from which they may be brushed off, the seed corn being thus freed from them.

5. Tares. The strangle or tine tare, *ervum tetraspermum*, is a horrid pest where it prevails among corn. It climbs and ultimately surmounts the straw, and being a branching plant, binds large masses of the corn together, so that both the weed and corn must be mown together to clear it off the land. This weed is most troublesome in wet summers, and lies long dormant in the land till a favouring season occurs. When the seeds appear in the sample they are easily screened or sifted out, being smaller than any kind of corn.

6. Wild oats, or haver, as they are provincially called, appear occasionally in crops of corn; but this can only arise from carelessness in selecting the seed. They may escape the eye among the brown variety of Tartarian oats; but in other corn they are easily detected.

Sandys pecten veneris is the crow-needle, an annual weed found in every field of light soil. It is a plant of humble growth and not annoying to the crop, but its long needle-shaped seeds are troublesome in the barn, causing much labour to sift them out of the grain.

Black bind-weed (*polygonum convolvulus*) and annual snake-weed (*polygonum lapathifolium*) are two weeds common on fen-land, but seldom seen anywhere else.

Horse-gold (*ranunculus arvensis*). This is the corn butter-cup, the seeds of which are sometimes found in wheat. The seeds are flat, a little convex on one side, concave on the other, edges fringed with crooked bristles, by which they attach themselves to the wool or hair of animals. They are not easily cleaned out of wheat, and are detested by the miller.

Charlock (*sinapis arvensis*). This is a very common weed, especially among barley, but it can be easily sifted or screened out, so that it need never be sown with corn of any kind. When it abounds among wheat, it is a sign that the seed-wheat has been laid in too light, and the only cure for this is to have the land well trodden down with sheep.

Melilot (*trifolium officinalis*), common melilot clover. This is an annual plant growing about two feet high. The capsules or pods are rough and wrinkled; each pod contains one or two seeds, which are not discharged by the flail, but the pods appear either whole or in parts among the grain, and cause much labour in sifting them out. If the seeds are ground with wheat, both flour and bread are damaged. This, like all other annual weeds, can only be destroyed by first encouraging them to grow and then ploughing them down.

Fallow-weeds, that is, those that require a fallow to extirpate them. These are 1, couch; 2, rest-harrow; 3, saw-wort; 4, curled dock; 5, tall oat-like soft grass; 6, colt's foot; 7, corn bind-weed; 8, corn-mint; 9, surface-twitch; 10, black grass.

This is a formidable list; but if a fallow be required for one, all the rest must suffer. Couch (*agropyrum repens*) is the most general plague, and can only be conquered in stiff ground by a summer-fallow, and on light land by repeated ploughing and harrowing, to bring the roots to the surface, and raked together to be burnt or carried off. And yet there are some eminent and successful farmers who never trouble themselves with either burning or carrying off couch, trusting entirely to the

frequent disturbance of the plough for its destruction, and this is quite effectual.

Rest-harrow (*ononis arvensis*), otherwise called cammock. This weed has almost disappeared from our fields. Neither plough nor harrow can disroot this tough-rooted weed; a mattock is required to grub them up.

Saw-wort (*carduus arvensis*), a very bad running-rooted thistle, and which is a great annoyance among wheat, as its prickly leaves wound the hands of the reapers. When these thistles have got possession they appear among wheat or other crops in April; they are then, or in the following months, cut out with a spud or weeding-hook. But this only checks, does not kill them; and their stems thus cut over, soon branch out and re-appear. Very deep ploughing and a whole summer fallow are the only means of subduing this troublesome weed.

Curled dock (*rumex crispus*), a well-known weed, common in fields both arable and pasture. The root runs deep, and every, the smallest piece of it left in the soil, produces a new plant. It is also much increased by seeds, and which are too often met with in samples of clover-seed. A tool called a dock-iron is made for drawing the roots in wet weather.

Tall oat-like soft grass (*holcus avenaceus*), or knotted-rooted oat-grass, a great plague to get out of land by reason of the brittleness of its roots; every particle left grows again.

Colt's-foot (*tussilago farfara*), a common inhabitant of deep loamy or clayey land; the roots lie deep and out of the reach of the plough, so that the plants are not easily extirpated. The flowers are yellow, and appear long before the large round leaves; and if both are destroyed soon as they appear will go far to weaken, and if persevered in, ultimately kill the plant.

Corn bind-weed (*convolvulus arvensis*), a very beautiful flowering weed, common on dry pastures and light arable land. It is a creeping plant on the surface, and its roots penetrate deeply, as well as far and wide under the surface. Drilled crops and the hoe constantly applied is the most eligible method of banishing this weed. Sheep are remarkably fond of the leaves, and prefer them to almost anything else.

Corn-mint (*mentha arvensis*). This plant is met with on damp gravelly soils, and is not easily got out. It has succulent under-ground stems, which, if broken into pieces, every particle makes a new plant. Collecting and carrying off the tussacs of the roots as turned up by the plough is the most effectual remedy. Land subject to this plant requires draining.

Wild carrot (*daucus carota*), hedge-paraley or dill (*torilis infesta*), common fool's parsley (*æthusa cynapium*), and fennel (*meum feniculum*), are all local plants more or less prevalent. Their seeds are objectionable in samples, and especially in those of clover, &c.

Corn poppy (*papaver rhæas*), blue bottle (*centaurea cyanus*), may-weed (*anthemis cotula*), and corn marigold (*chrysanthemum segetum*), are another class of corn-weeds which are very generally known as a mark of bad farming. The corn poppy accumulates on dry sandy or gravelly soils, and in hot summers occupies almost the whole surface, exhausting the land, and materially damaging the crop. The seeds are exceedingly small and numerous, so that when they have once got possession they are most difficult to eradicate, either by hand or hoe. Finely harrowing the stubbles in autumn, occasional fallows, and the drill husbandry, are the most efficient as well as most profitable means that can be had recourse to for getting rid of these and all other weeds.

Common knot-grass or wire-weed (*polygonum aviculare*). The root is long, very tough, and somewhat woody. It almost bids defiance to the hoe, and will even double under the plough-share, rather than quit its hold of the subsoil.

Black grass (*alopecurus agrestis*), also called black bent. The appearance of this grass among wheat is a certain sign that the crop will be worthless. It rises on poor loamy gravels that have been sown when in too wet a state. It is remarkable that it only appears on strong clays which have been sown when too dry.

Great round-headed garlic (*allium ampeloprasum*). This is a most noxious deep-rooting weed, partial to loamy districts. The stem and head of the plant are reaped with the grain, and if also thrashed therewith, the rank and disagreeable scent of the garlic is conveyed to the wheat, rendering it almost unsaleable.

May, 1843.

M.

OF THE WAGES OF FARM-SERVANTS.

Winter is the time in which *wages in kind* are paid to farm-servants; and the part of that season chosen for the purpose is about the end of the year. It is requisite that harvest shall be completely over in the latest season, and every preparatory operation connected with the accommodation of stock, either on turnips or in the steading, to be gone through, before the business of thrashing the crop in a regular order be commenced. In connection with thrashing the crop, a plan should be

adopted for supplying straw for fodder and litter, as well as for placing a quantity of new oats in the granary, to be drying, and to be ready for use by the time the perhaps small stock of old corn shall be consumed. After all these preparatory operations incidental to winter have been accomplished, and before much of the new crop has been disposed of at market, further than to ascertain its general quality and price, the first leisure afforded by them is taken for paying the farm-servants their yearly wages of corn; and as the quantity distributed is considerable on a large farm, and as all their servants should receive their wages at the same time, to avoid jealousy, there will be a considerable quantity of thrashed grain in the barn before the distribution takes place. The servants receiving a variety of corn, that kind should be first distributed which is found most convenient for the farmer to thrash; and each kind should be delivered, and the barn cleaned out, before another is interfered with.

I have already enumerated the different classes of labourers employed on a farm; and I may here mention generally, that the wages of all may be classed under three heads:—1st, Those consisting chiefly of *kind*, that is, of the produce of the farm, and but a *small* sum in *cash*; 2nd, those consisting of a *large* proportion of *cash*, and *small* amount of *kind*; and, 3rd, those which consist *entirely* of *cash*. The recipients of the first and third classes may be engaged on the same farm, and the third class may be found exclusively on a farm, but the first and second classes are never found together; and as all three modes of paying wages co-exist in this kingdom, though in different parts of it, they afford a criterion for judging which is the best mode for all parties, for master and servant; which the most convenient for the master; which the most conducive to the servant's comfort and moral habits. *Ploughmen* or *hinds* constituting the principal or staple class of labourers on a farm, like the battalion men in a regiment, the terms of their wages are taken as a standard of comparison for those of the rest.

Ploughmen's wages.—These are paid in all the three modes enumerated above; the first mode being in general adoption in the Border counties of England and Scotland: the second mode being practised in the midland and northern counties of Scotland: and the third having long been adopted in the southern counties of England.

Wages in *kind* and *money* differ in their constituent items, in different counties, but only in a slight degree; the aggregate items affording sufficiency of food to support a ploughman and his family. I shall enumerate the particulars received by the ploughmen of Berwickshire and Northumberland:—

In Berwickshire.

10 bolls = 60 bushels oats, at 12s. 10½d per boll...	£6	8	9
3 " = 18 " barley, at 19s. 10½d.....	2	19	7½
1 " = 6 " peas, at 23s. 3d.....	1	3	3
12 " = 1200 yards potatoes, at 4s.....	2	8	0
A cow's keep for the year	8	0	0
Cottage and garden.....	1	10	0
Carriage of coals	2	0	0
Cash	4	0	0
Equal to 10s. 11½d. per week.....	£25	9	7½

In Northumberland.

6 bolls = 36 bushels oats, at 12s. 10½d per boll	3	17	3
4 " = 24 " barley, at 19s. 10½d.....	3	19	6
2 " = 12 " peas, at 23s. 3d.....	2	6	6
3 " wheat, at 47s. 2d. per quarter..	0	17	8½
3 " rye, at 29s. 4d.....	0	11	0
40 " potatoes, at 1s.....	2	0	0
24 lb. of wool, at 1s.....	1	4	0
A cow's keep for the year	9	0	0
Carriage of coals.....	2	0	0
Cash	4	0	0
Equal to 11s. 5d. per week.....	£29	15	11½

To the money value of both particulars I attach no importance, further than giving to them a tangible form; for the *prices* of agricultural produce affect neither master nor servant in their relation to one another, the point simply being, that the master supports the servant in an adequate manner. Any difference, therefore, shown in the weekly wages between 10s. 11½d. and 11s. 5d., as brought out in estimating the money-value of the particulars, does not in fact exist, because the ploughmen in both counties live equally well. Instead of taking an imaginary rate of prices, I have selected the aggregate average, as given in the Universal Corn Reporter of 20th January, 1843. Besides working a pair of horses, the ploughman is bound to supply a field-worker, whether a woman or a boy, usually the former, whenever the farmer requires her services, and who receives for her work 10d. a-day, and in harvest 2s. 6d. a-day, besides victuals. In harvest wages there is a difference between the two counties, and it is explained in this way. In Northumberland, it will be observed, that the rent of the house and garden is set down at £3 a-year, whilst the ploughman receives 2s. 6d. a-day, and victuals, for the field-worker in harvest; whereas, in Berwickshire, the ploughman is bound to work the harvest as rent for his house and garden, receiving only victuals, which I have estimated at that season at 1s. a day for 30 days, which is as long a period as harvest may be

expected to last, and which should be deducted from £3 of rent. There is also a difference in the cow's keep. In Berwickshire the allowance is 60 stones of 22 lb. of hay in winter in lieu of turnips; but turnips are always preferred, and these are given to the amount of 6 double horse-loads, 3 of white, and 3 of swedes. In Northumberland 10 cart-loads of white turnips are given, or 5 of white and 3 of swedes; or, in lieu, 1 ton of hay, or 100 stones of 22 lbs.; so that the Northumberland cow is better off by £1 in winter than the Berwickshire, and the difference is certainly so far an improvement on the condition of the English hind. Both cows have as much straw as they can use. The grain which the ploughman can claim is next in quality to the seed-corn; and in Berwickshire he receives it in advance at the end of the year, which is in the middle of the year's engagement from Whitsunday (May) to Whitsunday. In Northumberland, the corn is paid in advance once a quarter. The corn is ground, in any way the ploughman pleases, at one of the small mills of the country, for the mere miller's multure; so he saves the profits of the retail dealer. If he cannot consume all his corn, the farmer willingly takes what he has to spare at the current market price. The produce of the cow, over and above what is required to serve the ploughman and his family, may be disposed of; and if the cow is a good one, and the season favourable, and the wife a good dairymaid, a considerable sum may be realised from the cow during the year. Her calf, if early, and gotten by a well-bred bull, will fetch £2, and perhaps more; if late, it may still be worth 20s. The refuse of the dairy, of the garden, and the house, enables the ploughman to fatten two pigs every year; one for his own use, and the other to dispose of. The cow is the ploughman's own property, and to lose her by death is a serious affliction upon him. I have seen men with families much injured by such a loss, and could never refrain from rendering the poor fellows some assistance. To avert so serious a calamity to a poor man, *cow-clubs* have been established, to purchase cows for the members who may have the misfortune to lose them. Farmers subscribe according to their number of ploughmen, and each ploughman who wishes to enjoy the benefit subscribes 1s. a quarter to the funds of the club.

Wages, more in cash than in kind, are more extensively given in Scotland than the plan which I have just described. Those who receive this species of wages are chiefly single men, living either in the farmer's house, or in a house by themselves called a *bothy*. The practice of allowing farm-servants to take their meals in the farmer's house is falling fast into desuetude, and its abandonment is much to be regretted,

for it is a far better plan for the comfort of the men themselves than the bothy system. But married men are also supported in this form of wages, though their condition is not so good as that of the ploughmen on the preceding plan, but it is certainly preferable to the bothy system.

The portion of wages received in *kind* consists of oatmeal and milk. The meal amounts to 2 pecks per week for each man, that is, 1 stone of $17\frac{1}{2}$ lb., which makes $6\frac{1}{2}$ bolls per annum, or $65\frac{1}{2}$ stones of 14 lb.; and this at 1s. per peck gives a money-value of £5 4s. a-year. The milk is supplied either fresh from the cow or after the cream has been skimmed off, according to agreement. In the former state it is given to the amount of 1 Scotch pint or 2 quarts a-day; and in the latter state, 3 quarts are given in summer, and 2 in winter. The value of the milk is usually estimated at £4 a-year. In some cases a cow or cows are supplied to the men, who milk them, and are exchanged for others when they go dry; but supplying milk is the least troublesome plan for the master. These items of *kind*, with from £10 to £14 a-year of cash, varying with the rate of wages in the country, or according to the skill of the ploughman, constitute the earnings of a ploughman on this system. It is only in the amount of cash that these wages vary at any time, for what is given in kind is considered invariable, being no more food than a stout man can consume; but some cannot consume it all, and save a part of the meal, which they either dispose of to the farmer or to dealers. In strict fairness, the meal should be given to the men every week, but to save trouble, it is dealt out once a month or once a fortnight. The milk, of course, is supplied every day.

Besides these principal ingredients, the married men get a house and garden rent-free, and coals are driven free to their house. The single men are provided with a room containing a number of beds, which are occupied each by two men; and the bed-clothes, consisting of a chaff-ticking and bolster, blankets, sheets, and coverlid, are provided by the master, and replaced clean every month. This room is called the *bothy*, and it usually forms both the sleeping-chamber and cooking-apartment of all its inmates, which may amount to as many men as there are ploughmen employed on the farm. The men are supplied with fuel all the year round, with which to cook their victuals, and which they do for themselves. The fuel consists of wood, brushwood, or coal, according to the supplies of the locality: but in winter, coal is always laid in to the extent of 1 ton each man. Salt is also provided by the master; and he also furnishes a pot for cooking in, a dish for holding milk, and some forms, and perhaps a table; but this last article of furniture is often dismissed from the bothy with little ceremony, a form, or the lap.

making a much more desirable dinner-board. A few potatoes are generally given in winter.

The ploughmen who receive *cash for wages*, are in the same condition as day-labourers, who receive their earnings once a week, and purchase their subsistence at retail dealers in country towns and villages. This, I believe, is the condition of most of the ploughmen in the southern counties of England. There is one obvious remark, occasioned by this statement, which cannot fail to be considered by every farmer, which is, that unless money-wages adapt themselves to the fluctuating prices of the commodities upon which farm-servants subsist, servants so paid must suffer much privation on a rise in the price of provisions; and, on the other hand, when prices again fall, they receive higher wages than they are entitled to. They are thus subjected to vicissitudes in their condition, from which the two former classes of ploughmen are exempt.

The *wages of stewards* are in all respects similar to those of the ploughmen of whom they have the charge, the only difference being in the amount of cash received, which is always greater than that given to the ploughmen. Instead of £4, given to the former class of ploughmen, they may receive £12 or £15, and instead of £12 or £14, given in cash to the latter class, they may receive from £20 to £25; and if there is any difference in the size or situation of the servants' houses, the best is appropriated to them. In most cases the steward is exempt from attendance on the farm on Sundays, whilst in others he takes his turn along with the other men, which latter is the better plan for the master, as the steward can then have much better opportunity of observing whether the men fulfil their duties properly.

The *shepherd* receives the same amount of kind and money as the ploughman; but as he is accounted a skilful servant, and his hours of attendance extend every day from sunrise to sunset, he has leave to keep a small flock of sheep of his own, which is maintained by his master, and the produce of which he is entitled to dispose of every year. His flock consists of breeding ewes, which vary in number from half a score, such as of Leicester ewes in the low country, to perhaps two score of black-faced ewes in the highest districts. About one-fifth of the number of the ewes being disposed of every year, he is entitled to retain as many ewe lambs of his flock as will maintain the full number of his breeding ewes. The shepherd's dog is his own property, often purchased at a high rate, and trained with much trouble and solicitude.

The *hedger*, being considered a day-labourer or spadesman, gets a smaller proportion of kind than the first class of ploughmen, and more money, and generally no cow's keep; and where the second class of

ploughmen exist, no hedger is kept as a hired servant, but is viewed in the light of a day-labourer, and is paid money-wages accordingly. Being a skilful man, the hedger never receives less than £40 a-year in value, and more frequently £1 a-week. He can sow corn, build stacks, and do anything that the steward can, and sometimes all that the shepherd can besides.

The *cattle-man*, being viewed as a labourer, receives some of his wages in kind, and the rest in cash, and is seldom indulged with a cow. Being generally a person somewhat advanced in life, the rate of his wages is low—perhaps 9s. a week.

The *field-worker* is simply a day labourer, and receives 10d. a day, without any wages in kind from the farmer. This person is usually a woman. The first class of ploughmen are each bound to supply a field-worker for the farm during the year, they receiving the wages earned by the workers in that time. They hire the women in the public markets, and support them in their houses with bed and board and wages.—*Stephens's Book of the Farm*.

CULTURE OF THE TUSSAC GRASS.

Sir,—I have seen in the British Farmer's Magazine an account of the Tussac Grass; and as I wish to give it a trial, I should feel greatly obliged by your sending me the particular system of its culture, and by informing me where I can obtain a small portion of the seed.

I am, Sir, yours, obediently,

J. V.

CUCKFIELD, Sussex,
June 2nd, 1843.

[For full particulars of the cultivation of the Tussac Grass, we refer our Correspondent to page 195 of the present Number; but, as regards his inquiry about the seed, we can furnish no positive information; we fear there is no seed yet available in this country. There is, however, no doubt, that when it becomes an object of much inquiry, our seedsmen will take measures to supply the demand. But surely it comes within the province of the Royal Agricultural Society of England to introduce every foreign seed, root, or implement, that may be likely to benefit the agriculture of this country?—*EDIT.*]

NOTICES OF NEW PUBLICATIONS.

Prize Essay of the Wetherby Agricultural Association, September, 1842.

On the Application of Rape Dust, and other Hand Tillages. By
John Hannam, Hon. and Cor. Mem. of the N. Y. State Ag. Soc.
Leeds: Bolland and Co.

Mr. Hannam has, in this unpretending little work, added much to the weight of obligation already due to him for his exertions in the cause of practical agriculture.

To no one cause, perhaps, is the progress of modern improvement attributable more than to the introduction and judicious use of what Mr. Hannam calls "hand tillages."

"If," says he, "we make it a principle to return, in the shape of manure, more of the matters nutritious to vegetables than we have carried away in the crop, the earth will vie with us in generosity.

"The question, however, arises, *What are the matters which*, under the name of manure, *we must apply*, to succeed in this important object?"

It is this point which Mr. Hannam has endeavoured, and we think with success, to ascertain and determine. For it is not enough to tell the farmer that gypsum, for instance, is the best possible manure for clover and other layers, when his land may be already overdone with it. He sees with astonishment the effect it produces on his neighbour's land, and marvels to find it wholly inoperative on his own. The truth is, he has been carrying coals to Newcastle; his land is already supplied with the article; and consequently whatever he adds is useless. "We know that a field may produce one description of crop and not another, because it may be rich in a substance of high value for the nutrition of the one, and deficient in some matter of equal use to the other. The same reasoning shows us that it may be manured with one substance, and show no increased signs of fertility, because it has already sufficient of the elements principally supplied with that manure. The principle, therefore, that should guide us in the application of a fertilizer should be—a *consideration of the natural or artificial deficiencies of the soil, and of the wants of the succeeding crop.*

"Thus a soil may be rich in vegetable and animal matters, and yet produce a bad crop, because it is deficient in the mineral substances requisite to perfect the grain and straw. For instance, peaty soils, though composed principally of vegetable decay, will not fill the ear with grain. The reason is, that they are deficient in those animal and

mineral matters required in a fertile soil. A case in point is referred to by Professor Johnston (*Quarterly Journal of Agriculture*, June, 1842), who, being applied to on this head, recommended a dressing of bones dissolved in sulphuric acid—which would afford the plant phosphates and sulphates of lime (bones having a large share of phosphates)—and a small quantity of nitrate of soda to supply the nitrogen which is necessary to form the seed of all plants. The result of the application may be given in the words of the experimenter, Mr. Fleming, of Barochan: ‘The straw appeared, on examination, as stiff and shining and the plant as well filled, *as if it had been grown upon stiff loam*; and I consider the same dressing, applied to grain crops *upon moss*, will insure a good crop of well-filled oats.’ Professor Liebig also mentions a case at Bingen, on the Rhine, where a vineyard was manured with animal and vegetable matters, which hastened the growth of wood and leaves, so that the potash necessary to form the ashes of the plants was quite exhausted in two or three years, and the vineyard became incapable of putting forth more wood. How often, too, do we see land ‘tired’ or ‘sick’ of growing clover, from the fact of successive crops of artificial grasses and turnips having exhausted the soil of the phosphates and sulphates, which are required by these crops in large quantities?

“Again, a soil may be rich in inorganic matters, and yet no adequate grain crop can be raised from it. It may require vegetable matter to supply carbon to the plant, and animal matter to supply nitrogen, without which the grain cannot be formed. Thus by using bones we may obtain good crops of turnips. If no other tillage, however, is applied, for a length of time, it will be found that the crop will not succeed so well. The reason is, that bones convey to the soil a great deal more of the inorganic constituents (principally phosphates) than of the organic food of plants; and, as the turnip requires a great quantity of these phosphates, and as it draws a great deal of its organic matter, in the shape of the carbonic acid of the atmosphere, through its leaves, it is some time before the animal or vegetable matters in the soil are exhausted. When this is the case, a few good dressings of farm-yard compost will restore the soil to its usual condition. From the above illustrations of the principle that should regulate the application of fertilizers, the farmer may deduce the valuable and practical truth, that it is only by a *variety of applications that he can supply a variety of wants*.”—Pp. 9, 10.

What the farmer wants to know is this—the manure best adapted to his particular soil. The question with him ought to be, not whether such and such an article will benefit the crops of another county, but

whether it will improve those of his own? and if not, *why* not? Unless a man can discover this, he is working in the dark, and is pursuing a hit-or-miss system, quite as likely to do him harm as good. The whole tenor of the "Essay" before us is to throw light on this darkness, and the various "hand tillages" are each in turn minutely and clearly described.

Of rape-cake, when reduced to powder, Mr. Hannam has justly formed a very high opinion. It is, though not the newest, certainly one of the best, of the hand manures. Of the mode of its application, we are glad to notice a few words of caution, which, in our own case, we have proved to be highly necessary, and which, had they not been given, we should certainly have felt bound to furnish ourselves. We mean the necessity, in drilling, to keep the manure separate from the seed. The rapid fermentation which takes place in the soil, will else destroy so small a seed as that of turnips. Mr. H. advises rather a clumsy method of obviating this, by mixing the seeds with ashes or earth. A far simpler and better way is, to use a drill like Smyth's of Peasenhall (Suffolk), which deposits the seed by means of one coulter, fleet, and the manure by another, deep; a layer of earth intervening between the two.

Having mentioned gypsum as a manure, we extract the following passage, which, at the time we then wrote, we had not noticed:—

"Sulphate of lime (gypsum), like salt, should be applied on soils *where it does not exist*. And where clovers begin to fail upon lands, it may be taken as a pretty correct evidence that the soil has become exhausted of its gypsum, since the green crops contain it in sensible proportions."—P. 32.

Again. "No complaint is more common than to hear, that, since the growth of so many turnips, clovers more frequently fail. The reason is, that both require phosphates and sulphates of lime. The phosphates we apply in the bones we use; the sulphates we forget: the result of which is, that red clover, which contains a large share of them, cannot flourish."—P. 33.

One more quotation and we have done.

"One question will strike the practical farmer. It is this: if these manures are so valuable—so potent, that 1 or 2 cwt. per acre is tillage sufficient, and as they are made out of materials to which we have access (aye, which we often waste), can we not compound for ourselves a valuable fertilizer? Decidedly! As much urine is wasted as would, if applied properly, says Mr. Milburn, have an effect equal to all the

hand tillages employed by the farmer. This will not seem strange when we consider that this liquid contains *all the essential* food of vegetables in a state of solution, and that, in fact, every pound will produce a pound of wheat (Liebig). Let, then, the farmer, in the first place, collect the liquid from his cattle-sheds and manure-hills; let him next gather together a quantity of earth, ashes, and night-soil. To these he should add a few cwts. of gypsum and charcoal, and then pour the liquid from the reservoir upon the heap. This application should be continued at intervals. If a pungent smell begins to be emitted, a little more charcoal or gypsum should be added, and as many ashes as possible, since they contain both charcoal and gypsum: the former of which absorbs, and the latter *fixes*, the ammonia, which would otherwise escape."—P. 34.

T.

Elements of Practical Agriculture. By David Low, Esq., F.R.S.E.
Fourth edition. London: 1843.

The appearance of a fourth edition of any work, but more especially of an expensive work of comparatively confined interest, is ample evidence of its value. It would, therefore, be superfluous in us to write a laboured encomium on, or to quote passages in illustration of the excellence of, this fourth edition of Low's *Agriculture*. We must, however, state that the work has been revised and somewhat augmented with matter, which, if it has not greatly increased the value, has added more interest to some portions of the work than they previously possessed.

We have often asserted and proved, in contradiction to the theory of closet-geologists, at present prevalent, that a geological map of a district is not a key to the nature of the soils of the district it represents. Mr. Low's view of the absurd theory coincides with ours, and we quote the passage in which it is expressed, not only to show that we are not singular in our opinion, but, so far as our readers are concerned, to put an end to a theory that has a mischievous tendency, backed-up, as it is, by men of high authority as geologists.

"With respect to the agricultural characters of the soils produced from the tertiary deposits, it has been seen, that, in the case of the oldest, the London and Plastic clays, no general rule can be given for determining their characters, whether with relation to their texture, their composition, or their productiveness. The formations superior to these, again, are equally incapable of being reduced to any law, with relation to the soils formed upon the surface. Sometimes the soils are exceedingly fertile, as in the case of those muddy flats formed at the

mouths of such rivers as the Ouse, the Humber, or the Thames, or of those wide valleys in which the carses of Scotland have been formed; but even in the midst of these rich deposits, infertile tracts occur often of considerable extent. In the counties of Norfolk and Suffolk, which are wholly tertiary, we shall find every kind of soil, from the deep clay of the lower grounds to the heathy moors of the higher; and every where peat, drifted sand, and rolled pebbles, are to be found in the richest districts, rendering the surface barren.

"It will now be seen that the relations which we can trace between the mineral deposits of a country and the character of the soil, are often uncertain and obscure. When, indeed, we regard a considerable tract of land, we can, for the most part, trace a connection between the sub-jacent rocks and deposits, and the subsoil and consequently the soil. Thus, in a country of sandstones and arenaceous beds, we shall find the soil sandy; in one of limestone, more or less calcareous; in one of schistose rocks, more or less clayey. But even in tracts of the same geological formation, there exist great differences in the upper stratum, arising from the prevalence of one or other member of the series, or from the greater or lesser inclination of the strata, by which the debris of the different beds are more or less mixed together on the surface. The action of water, too, in denuding the surface at one part, and carrying the debris in greater or smaller quantity to another, exercises everywhere an important influence on the characters of soils. Thus, the fertility of a soil on the higher grounds, from which the earthy particles are washed, is found to be very different from that of the valleys to which these particles are carried. It is seen, accordingly, that, within the limits of the same geological formation, soils are greatly varied, and that the mere knowledge of the formation will not enable us to predicate the character of the soil of any given tract, either with respect to its texture, its composition, or its productiveness. The primary rocks, the most constant of any in their characters, yet yield soils of very different properties, under the different conditions to which they may be subjected. Thus the rocks, which, in the mountains of Argyleshire, are so barren, yield in the islands of the Channel a soil of high fertility. The transition rocks in this country are indeed generally infertile and uncultivated; but this is not because they do not contain the elements of fruitful soils, but because they form tracts of mountains. In the east of Jersey, around the town of St. Helier, the transition rocks yield one of the most fertile soils of the country; and if we pass over to Normandy, we there find the finest soils of the province derived from the primary and transition rocks. The old red sandstone, it has been seen, presents

soils, from the most barren to the most fertile. The coal formation produces every diversity of soil, from the clays of the ferruginous hills to the loams of the lower country. The new red sandstone is the most continuous tract of fertile land of the same extent in England; but the new red sandstone is a district of plains and valleys, following the course of rivers; and yet, even within the limits of the new red sandstone, are tracts so barren as to be left uncultivated. The lias, although a tract of clays, presents no uniform character with respect to fertility; and the soils of the oolites are so varied as not to admit of being classified according to their economical value; and similar remarks apply to all the geological formations down to the most recent.

"We see, therefore, that the mere knowledge of the geological formations of a country, does not afford the data for determining the nature and properties of the soils in the manner required for practice. Speculative writers, indeed, have maintained, that a knowledge of geology is not only eminently useful to the practical farmer, but even necessary to enable him to distinguish soils, and adopt the suitable means of improving them. It is surprising that such statements should be hazarded. The farmer, as all experience shows, can distinguish soils by their agricultural characters much more certainly and readily than the geologist can by their geological; and it does not appear in what manner geology can give that knowledge to a farmer which can enable him to cultivate and improve his land. The farmer, it is manifest, must regard the soil which he has to till, not in its relations with a whole district, but with reference to its own characters and fertility. He may find the soil not only of a single farm, but of a single field, varying in every degree; and it will be necessary that he adapt his management to these variations, whatever be the geological formation in which he may be placed."

American Agriculture and Agricultural Literature. Fourth Report of the Agriculture of Massachusetts. By Henry Colman. Boston, U.S.

The position of American, is, in most respects, inferior to the position of British agriculture; but in the activity of enquiry, in zeal to advance agriculture towards perfection, the Americans have the advantage of us. England produces three agricultural periodicals, two monthly, and one quarterly; Scotland one, quarterly; and Ireland, we believe, has so far failed to support one, though several attempts to establish such a periodical there, supported by writers of ability, have been made by respectable publishers. But in America agricultural periodicals, con-

ducted and contributed to by men of the highest talent, abound in every state, but more particularly in the middle and northern states; and their abundance is the clearest evidence of the attention the Americans bestow on agriculture. In America, too, agriculture is fostered by the governments, and information beyond the reach of individuals is gathered and made available at the public expense. We are not certain that it is the case in all the states, but in several, geological and agricultural surveyors are part of the government staff. The report before us, one of a series of the Agriculture of Massachusetts, is an example of the results of the labours of one of those surveyors; and it is creditable alike to the author and the government that employed him. A more really practical report we never saw.

Our readers are already acquainted with Mr. Colman, by name; we introduced him in a notice of one of his previous reports. The gentleman is now, we are given to understand, in England, to study our agricultural practices, for the benefit of his country; and we beg to bespeak the attention of those of our readers who may have opportunity to communicate with him, to the object Mr. Colman has in view, and to desire their assistance. The reciprocating of kind actions between people and people does more to bind them in friendship than treaties of commerce or of offence and defence.

In the preface to the report Mr. Colman shows what he has done, and what his commission cost the state. We quote the passages to show what an honest dealing with public money, and talent, and zeal for public good, can effect.

“The whole cost of the survey to the state thus far, had it been assessed upon the inhabitants, would scarcely have exceeded a tax of one cent per head; and this for the advancement of the greatest interest of the community, though in many cases the least regarded. Almost all the cost incurred in its prosecution has been expended in the state, and has not gone out of the family. Of the amount (eighteen hundred dollars per annum) paid to the commissioner, nearly two-thirds have gone to the actual expenses of the survey; such as travelling charges, payments for information procured, books distributed, seeds and implements purchased for exhibition and gratuitous distribution among the farmers, and for various incidentals growing out of the commission. The balance, varying from six to eight hundred dollars, can hardly be considered as an over-compensation for the time and labour devoted to this object.”

"Of the fourteen counties in the state I have pretty thoroughly explored ten, having visited almost every town, sought the acquaintance of some of the best farmers in the several towns in each of these counties, and examined, as far as I could learn them, the principal agricultural improvements in each of them. I have attended all the cattle-shows and fairs, which have been held during the term of my commission, whether county or town shows, as far as the separate days of holding these shows permitted me to do it. I have held meetings of the farmers for conversation and discussion in several parts of the state. I have maintained an extensive correspondence with farmers in all parts of the state, and in many of the other states. With leave of the executive, I have travelled several thousands of miles in other states for the purpose of looking at their improvements and gathering information, which might be useful to the farmers of Massachusetts; into Vermont, to see their sheep husbandry; into Connecticut, Rhode Island and New York, to see their improved stock; into New Jersey, to see the application of their marls, and to look at their beet-sugar establishment; into Pennsylvania, to see the application of lime; and into New Jersey, Pennsylvania, Virginia, and the district of Columbia, to look at their culture of silk. It was understood, and expressly provided for in the resolve authorizing the survey, that the commissioner should suggest such improvements as he considered desirable and practicable in the agriculture of Massachusetts. He could hardly be expected to do this to the best advantage without seeing what improvements had been made in other places; and the extraordinary facilities for travelling had enabled him to visit them, without essentially interfering with the examination of his own state. Besides this, by request of the farmers he has delivered, in different parts of the state, at least twenty agricultural addresses, of which seven have been printed and gratuitously distributed. He has published likewise in his time,

"1. An extended Circular Letter to the Farmers of Massachusetts, pointing out, in detail, the nature and objects of an Agricultural Survey.

"2. A Treatise upon the Use of Bone Manure.

"3. A Report on the subject of a Board of Agriculture.

"4. A Memorial to the Legislature on establishing a Department of Domestic Industry, and the collection of Agricultural, Manufacturing and Commercial Statistics.

"5. A Report on the Culture of Spring Wheat, by order of the Senate.

"6. The First Report of the Agriculture of Massachusetts, embracing principally the County of Essex.

"7. The Second Report of the Agriculture of Massachusetts, embracing the County of Berkshire.

"8. The Third Report of the Agriculture of Massachusetts, embracing the subjects of Wheat and Silk, by order of the Senate.

"9. The Fourth Report of the Agriculture of Massachusetts, embracing the Counties of Franklin and Middlesex.

"10. An Address to the Farmers of Essex County, on the Improvement of their Agriculture.

"11. A full Report of the Speeches of Daniel Webster and B. Silliman, on 13th January, 1839, at the Agricultural Meeting, in Boston, with copious notes.

"12. A Full Report of the Speech of H. A. S. Dearborn, at the Agricultural Meeting, on 28th February, 1840.

"13. A full Report of the Speech of George B. Emerson, on the Forest Trees of Massachusetts, at the Agricultural Meeting, in March, 1841.

"14. An extended Report of the Remarks of Charles T. Jackson, at the Agricultural Meeting, 30th January, 1840, on Agricultural Chemistry.

"Besides these services, he has instituted and provided for a series of weekly meetings of the farmers in the legislature, and others interested in agricultural improvement, which have been held during three successive sessions of the legislature, which meetings he has punctually attended, and of which he has constantly furnished full reports for the public papers. These meetings have been the means of eliciting and diffusing a large amount of practical agricultural intelligence, gathered from the experience of some of the most intelligent farmers in this and in other states. They have been much attended, their utility acknowledged, and they have been visited by many distinguished gentlemen of science and skill, from various parts of the country."

As a sample of the information contained in Mr. Colman's Report, we insert an account of

AMERICAN METHODS OF FEEDING SWINE.

"E. Phinney's swine establishment at Lexington, is among the most extensive in the county. His number of fattening swine averages about 100, with 50 store hogs, and they are killed in February and March, when from 10 to 18 months old, being of the fall and winter litters of the previous year. His pens are well arranged; seldom occupied by more than three or four in a pen. They have a manure-yard attached to each pen, into which bog-mud and litter are thrown for their manu-

facture and compounding, and they have always a dry and comfortable bed. They are fed regularly three times a day. I shall subjoin an account given by himself of his mode of management, which the farmers will read with interest; and shall annex in the Appendix, a sketch of his sties or barracks.

“ ‘ An inquiry is often made as to the best time of killing, or at what age it is most profitable to slaughter them. On a large farm where much green herbage is produced and where the value of the manure is taken into the account, the pigs killed at the age of 15 and 16 months, give the greatest profit. When it is intended to kill them at this age, they may be kept on more ordinary and cheaper food for the first 10 or 12 months, or till within 4 or 5 months of the time of killing. The manure they make and the extra weight of pork more than pay the expense incurred in keeping them the longer time; but the spring pigs which are to be killed the ensuing winter and spring, must be kept upon the best of food from the time they are taken from the sow until they are slaughtered.

“ ‘ The older class of pigs from the first 10 or 12 months are kept principally upon brewers’ grains, with a small quantity of Indian or barley-meal, or rice, ruta-baga, sugar-beet, &c., and in the season of clover, peas, oats, corn-stalks, weeds, &c., which are cut green and thrown into the pens; the next 4 or 5 months before killing they have as much Indian meal, barley meal or rice, with an equal quantity of potatoes, apples or pumpkins, as they will eat, the whole being well cooked and salted, and given to them about blood warm. During the season of fattening, an ear or two of hard corn is every day given to each pig. This small quantity they will digest well, and of course there is no waste. Shelled corn, soaked in water made as salt as the water of the ocean for 48 hours, with a quart of wood-ashes added to each bushel and given to them occasionally in small quantities, greatly promotes their health and growth. Their health and appetite are also greatly promoted by throwing a handful of charcoal once or twice a-week into each of their pens. Their principal food should, however, be cooked thoroughly and nicely. From long practice and repeated experiments I am convinced that two dollars’ worth of material well cooked, will make as much pork as three dollars’ worth of the same material given in a raw state.

“ ‘ Pigs when first taken from the sow should be treated with great care, to prevent them from scouring and becoming stinted; when either of these happen, it will require many days and sometimes weeks to put them again into a healthy, growing condition. When first deprived of

the maternal food, a little new or skim milk, boiled and slightly salted and given to them often and in small quantities, will prevent scouring and greatly promote their growth. If intended for killing at the age of 9 or 10 months, they should be full fed all the time and kept as fat as possible. If, on the other hand, they are intended for killing at the age of 15 or 18 months, they should not be full fed, nor be made very fat for the first 10 or 12 months.

“ ‘To satisfy myself of the benefit of this course, I took 6 of my best pigs 8 weeks’ old, all of the same litter, and shut them in two pens, three in each. Three of these I fed very high and kept them as fat all the time as they could be made. The other three were fed sparingly, upon coarse food, but kept in a healthy, growing condition, till within 4 or 5 months of the time of killing, when they were fed as high as the others. They were all slaughtered at the same time, being then 16 months old. At the age of 9 months the full-fed pigs were much the heaviest, but, at the time of killing, the pigs fed sparingly for the first 10 or 12 months weighed, upon an average, fifty pounds each more than the others. Besides this additional weight of pork, the three “lean kine” added much more than the others to my manure heap. These results would seem very obvious to any one who has noticed the habits of the animal. In consequence of short feeding, they were much more active and industrious in the manufacture of compost, and this activity at the same time caused the muscles to enlarge and the frame to spread, while the very fat pigs became inactive, and, like indolent bipeds, they neither worked for their own benefit nor for that of others.

“ ‘For the purpose of increasing my manure-heap, my pens are kept constantly supplied with peat or swamp mud, about 300 loads of which are annually thrown into my sties. This, with the manure from my horse stable, which is daily thrown in, and the weeds and coarse herbage which are gathered from the farm, give me about 500 cart-loads of manure in a year.

“ ‘On regular and systematic feeding and clean and dry bedding, the success of raising and fattening swine very much depends. A faithful feeder, also, who has some skill and taste, and withal a little pride of vocation, is indispensable.’ ”

“ ‘Of all articles ever given to fatten swine Indian meal is, without doubt, the most nutritious. Mr. Phinney, it seems, has, by actual trial, settled a most vexed question, whether hogs should be forced by full feeding when young, or at first be only kept well in a growing state. He found it better, when designed to be kept more than a year, to let the young animal, by sufficient but not excessive feeding, have time to

develop himself and acquire a natural size, rather than, by filling him to repletion, to bring on a premature state of fatness, which seemed to check their growth. To young pigs, milk, whey, and butter-milk, are the best of all feed; but where cows are kept for the purpose of supplying the market with milk, the pigs will be of course regarded as very poor customers. 'The milkman will not call.' There is, however, as I have shown in page 254, under some circumstances, a mistake in this matter.

"The establishment of J. P. Cushing, Watertown, for keeping and fattening swine is upon a large scale, and is exceedingly well contrived for his situation. It consists of a long one-story building, with separate pens on one side extending the whole length, each designed for four swine, with an open yard and a lodging and eating-room to each, besides some lying-in apartments.* A commodious passage-way runs the whole length of it, with the troughs projecting into the passage-way, and a shutter for the troughs so contrived that the trough is easily cleaned at any time, and the food of the hogs is placed before them without admitting that which, in the usual slovenly mode of feeding, is but too common, an uncivil interference on their part before all is ready. Some contrivance as effectual as this for another class of animals would be quite useful at some of our public hotels and steamboats, and save us from the severe remarks of those foreign travellers who have little sympathy with our customary dispatch of business, and seem to look upon us as a nation of fire-eaters.

"The cooking apparatus is at one end. Had economy of room and ease of feeding been studied, the building might have been double the width, with pens on each side. In England, they are sometimes made circular with the cooking apparatus in the centre and the feeding-troughs all within the circle; but in such cases there must be much waste of room. Mr. Cushing's barracks are lengthwise of his cattle-yard, so that the manure from the pens of his swine is thrown immediately into the yard, and any litter or muck easily supplied in the same way. His store hogs, too, at pleasure may be turned into the cattle-yard with the advice given in *Æsop's* fable by the dying father to his sons, 'that there is a treasure buried in the field which they would find by digging for it.' The swine, however, do not much need the advice.

* "The length of this building, including the cooking-place, is 252 feet, width 12 feet, and height the same. There are twenty pens, each 12 feet by 8, and a yard of 12 feet attached to each pen. The number of hogs that can be accommodated depends upon their sizes—from three to six, say an average of four of 300 weight each. There were fattened fifty-two hogs last season, weighing, dressed, 15,573 lbs."

They are natural philosophers and go by instinct into deep investigations. Some of them should always be kept in barn-yards and cellars. They are of great use in turning up and mixing the manure; and in yards where cattle are fed upon grain, and the sweepings of the barn floors are thrown out, they take care that nothing is lost. I have known a considerable number of store hogs kept in a thrifty condition upon that only which they obtained in a yard where a proportional number of beef cattle were stall-fed. The philosophy of reciprocal uses, which is apparent in every department of nature, though it frequently presents itself in a form offensive to a fastidious taste, is, to a reflecting mind, always instructive on the wonderful economy of the divine providence.

"A very large hog establishment in this county is to be found in West Cambridge, on the farm of Abner Pierce. He keeps in his enclosure about 500 hogs. They are supported upon the city swill or refuse. No hogs are allowed to be kept in Boston but by special and extraordinary permission; and among the excellent municipal regulations, the refuse vegetables, meat, garbage, and offal of the houses are required to be kept by each householder in a box or barrel, which is emptied once a week or oftener by the city scavengers. This, being taken into the covered city carts, is delivered at Mr. Pierce's establishment, about five miles from the city, daily—he paying therefor to the city 4000 dollars per year on a contract for five years.

"His hogs, when I visited him, were in an enclosure of about fourteen acres, partly covered with trees, and bordering on one of the beautiful ponds in that vicinity; a picturesque situation most certainly, for animals making such humble pretensions to taste and sentiment. If nothing else, however, in the summer months they enjoy as much as their betters the luxury of a refreshing bath and quiet repose under the shade; both essentially conducive to their health and thrift. He has had no general disease among them, though occasionally a case of the "blind staggers." He considers this troublesome disease as proceeding wholly from indigestion; and he finds no difficulty in its cure, by procuring an immediate evacuation. For this purpose he gives a dose consisting of half a pint of lamp oil, and half a pint of molasses, strongly charged with pounded brimstone. This remedy is important to be known, as the disease is not uncommon among swine, and often proves fatal. This disease can hardly be considered local, though the "blind staggers" in years gone by, has been known to prevail in some localities, near at least one of these ponds, among a class of animals who assume to be of a higher rank, but who occasionally pollute these beautiful regions by a resort to them for purposes of dissipation; but a simple and perfect

preventive is at last found for *this* disease (so much more humiliating and dreadful in its effects on them) if they can be induced to take it, in "total abstinence."

"Mr. Pierce's hogs are purchased; he raises none. He buys them at a weight of 100 to 150 lbs. Their average weight when killed is from 250 to 300 lbs. He has a killing twice a year, though many of his hogs are kept a year. The supply of refuse from the city is sufficient, excepting at certain seasons of the year, when some meal and corn are given. They fatten in the yard without extra feed, excepting as above. At killing, the skins (that is, the small entrails) are sold at 10 cents a set; the harslet at 8 cents; which pay fully the expenses of dressing. The remainder is cooked for the swine, after saving and selling what can be used by the soap maker. The manure made in their beds where they are littered, is sold readily at four dollars per cord, and in quick demand. The average sales of manure are not less than one thousand dollars.

"In the enclosure there are extensive plank platforms, on which the garbage is spread when brought from the city. The right of cleaning the tables, after the hogs have filled themselves, is purchased by several neighbouring farmers at 2 dollars 50 cents per day. Much of the refuse thus obtained is spread upon their grass lands, or ploughed in on their cultivated grounds, or placed round their apple trees, and in every case with the greatest advantage. If not used immediately it is put into a compost heap and covered with mould. Some farmers who obtain it use much of it for feeding their own swine. One farmer stated to me that he had purchased the right of obtaining it two days in a week. He kept the last year fourteen hogs entirely upon these gleanings. The gain upon these hogs in live weight, from 1st October to 1st April, when he sold them on foot, was 2800 lbs. Other farmers have been equally successful in this economical process.

"A small example of fattening swine in Medway, Norfolk county, which came under my notice, seems worth recording, because an exact account of their cost was kept. The owner was a mechanic, and bought every article of their feed, not even keeping a cow. His two hogs, when killed, weighed—one 420 lbs, one 382 lbs, and pork was then worth 12 cents per lb. Value when dressed 96 dollars 24 cents. They were killed at 14 months old. They were bought in November and killed in the December of the next year. They were kept in the sty the whole time; were fed three times a-day with weeds, corn, and potatoes. The potatoes were boiled and the Indian meal mixed with them into a mash. They were fed exclusively on corn one week before being killed.

They did as well in winter as in summer. Salt was frequently given to them in their swill. The price of corn bought for them was 117 cents to 136 cents, or an average of 130 cents per bushel. Potatoes were 30 cents per bushel. The whole cost of the hogs when fatted was 62 dollars, including the price of purchase, or 7·8 cents per lb.

" I shall here subjoin some careful experiments made by myself a few years since in relation to this subject. They were given to some portion of the public at the time, in another form; but they may here reach many by whom they have not been seen, and to whom they may be interesting.

" *Experiment 1.*—Two hogs about one year old, one of them a barrow in very good condition; the other a barrow recently gelded and in ordinary condition, were put up to be fed exclusively upon Indian hasty pudding or Indian meal boiled with water. We began feeding them the 1st of March, 1831, and weighed them again on the 19th of the same month. In the eighteen days they consumed 6 bushels of Indian meal. They were offered cold water to drink but did not incline to take any. The result—

" No. 1 weighed on 1st March	233 lbs.
19th ,, ...	269
Gain	36
" No. 2 (recently gelded) weighed on 1st March	190
19th ,, ...	247
Gain..	57

" The gain of the two was 93 lbs. in 18 days. The quantity of meal consumed by them was 10 quarts per day to the two. We allow 30 quarts to a bushel, deducting 2 for grinding. The price of corn at the time was 70 cents per bushel. The expense of the increased weight is 4·5 cents per lb.

" March 21, 1831.—Killed the hog mentioned first in the foregoing experiment. Live weight 273 lbs. Weight when dressed 215 lbs. Loss in offal, loose fat included, 58 lbs., or a little more than one-fifth.

" EXPERIMENT 2.

" No. 2, mentioned above, weighed on 23rd March	253 lbs.
Ditto, ,, 30th April.....	312
Gain in 38 days	59
" No. 3, a shoat purchased from a drove, weighed on 28th March..	100
Ditto, weighed on 30th April	151
Gain in 33 days	51

" This is a fraction over 1 lb. 8 oz. per day each; nearly 1 lb. 9 oz.

" In this case their food was exclusively boiled potatoes mashed with

Indian meal. The exact amount consumed not ascertained, but fed as freely as they would bear.

" *Experiment 3.*—The two last-named hogs were for the next 20 days put upon Indian hasty pudding exclusively, with the following result :—

" No. 2 weighed on 30th April. 312lbs.		" No. 3 weighed on 30th April. 151lbs.	
20th May ..382		20th May.. 185	
Gain in 20 days	70	Gain in 20 days	34

" The two in the above-named 20 days consumed $4\frac{1}{2}$ bushels of meal, cooked as above. Meal 78 cents per bushel. Gain of the two, 104 lbs. in 20 days.

Experiment 4.—Sundry swine purchased from a drove, and fed with meal and potatoes, washed and mashed—

March 28, 1831.		May 19, 1831.	
" No. 1 weighed 97 lbs.....	165 lbs.—Gain in 52 days, 68 lbs.		
No. 2 " 134 ".....	182 " " 48 "		
No. 3 " 100 ".....	186 " " 86 "		

" The two following, raised on the farm, and fed as above—

April 25, 1831.		May 19, 1831.	
" No. 4 weighed 151 lbs.....	206 lbs.—Gain in 24 days, 55 lbs.		
No. 5 " 140 ".....	165 " " 25 "		

" *Experiment 5.*—In this case it was not intended to force their thrift, but to keep the swine in an improving condition. They were shoats of the last autumn, and were of a good breed.

" Tuesday, 3rd April, 1833. Put up four shoats, and began feeding them with Indian hasty pudding.

April 3.	April 22.	June 25.
" No. 1, 176 lbs..... 202 lbs.—Gain 25	264 lbs.—Gain 62lbs.	
No. 2, 119 ,, ... 153 ,, ,, 34	226 ,, ,, 73	
No. 3, 150 ,, ... 170 ,, ,, 20	218 ,, ,, 48	
		Total... 183

No. 4, 121 ".....145 " " 24

" From 3rd April to 22nd April, the above swine consumed 7 bushels and 1 peck of Indian meal. From 22nd April to 25th June, 7 bushels of Indian meal, cooked as above.

" One of the above, No. 4, was killed on 30th May; being absent, the live weight was not ascertained.

" On the 25th June, the three remaining hogs were weighed, and in the 63 days, from 22nd April to 25th June, they had gained in that time 183 lbs., as above.

" After 30th May, when one of them was killed, 1 peck of meal made into hasty pudding with a small allowance of the waste of the kitchen for a part of that time, lasted them three days, that is 22-25, or less than a quart, say seven-eighths of a quart per day to each.

" At first we employed half a bushel of Indian meal to make a kettle of hasty pudding; but we soon found that a peck of meal by being boiled sufficiently would make the same kettle nearly full of hasty pudding, and of sufficient consistency. The kettle was a common-sized five-pail kettle, set in brick-work in the house; and it was remarkable that the peck of meal produced nearly the same quantity of pudding that we obtained from the half bushel, which showed the importance of inducing the meal to take up all the water it could be made to absorb.

" The price of Indian corn was at that time 75 cents per bushel—30 quarts of meal to a bushel, deducting the toll. The amount of meal consumed in the whole time from 3rd April to 25th June was $14\frac{1}{4}$ bushels; the cost 10 dollars 69 cents; the total gain, making no allowance for the gain of No. 4, from 22d April to 30th May, which was not ascertained, was 287 lbs.

" The gain of No. 1, 2, and 3, from 22nd April to 25th June, was 183 lbs. in 63 days; and allowing 1 peck to serve the three hogs for three days, required $5\frac{1}{4}$ bushels, the cost of which was 3 dollars 94 cents. The live weight could not be estimated at less than 4 cents per lb. when pork was at market 6 cents.

" The value of the 183 lbs. therefore was equal to 7 dollars 32 cents, or at 5 cents to 9 dollars 15 cents.

" The gain of the swine for the first 19 days, from 3rd to 22nd April, was—

No. 1	26lbs.	or 1·368lbs. per day
No. 2	34	„ 1·789 „
No. 3	20	„ 1·052 „
No. 4	24	„ 1·263 „

" The gain from 22nd April to 25th June, 63 days, was—

No. 1	62lbs.	or 0·984lbs. per day
No. 2	73	„ 1·158 „
No. 3	48	„ 0·761 „

" The difference of daily gain in the two periods was attributable to the diminished quantity of meal. The question then arises, whether the first mode of feeding was as economical as the second.

" In the first 19 days, 7 bs. 1 pk. consumed, gave 104 lbs. gain

In the next 63 „ 5 „ 1 „ „ „ 183 „

" Had the first gain been in proportion to the second gain, in reference to the meal consumed, the $7\frac{1}{4}$ bushels which gave 104 lbs. should have given 252 5·7 lbs. This great disparity can be explained only in the more economical preparation of the meal, by which a peck, taking up as much water as it would contain, gave a kettle nearly full of pudding, when half a bushel of meal, imperfectly prepared, gave little more.

This seems to demonstrate the great advantage of cooked food, both as it respects its increase of bulk, and the improvement of its nutritive properties. Whether it would apply to those substances whose bulk is not increased by cooking, equally as to Indian meal and the like, is a matter which experiments only can determine.

“ With respect to the age at which it is advantageous to put up swine to fatten, I have only to remark that it is with swine as with other animals, there are some breeds which come much sooner to maturity than others. A successful farmer in Saratoga county, N.Y., says that March pigs, killed about Christmas, are the most profitable for pork. Four pigs, of what is called the grass breed, were slaughtered at Greenfield, N.Y., which weighed 348 lbs., 318 lbs., 310 lbs. and 306 lbs., at nine months and seventeen days old.

“ On this point, I present a letter with which I was honoured by the late John Lowell, whose authority in the agricultural community is justly estimated.

“ ‘ DEAR SIR,—I have been prevented answering your inquiries as to my experience in raising old or young pigs. I may say that I have fully and clearly ascertained, from a trial of 20 years, that young pigs of from 25 to 30 lbs. will give nearly double, in some remarkable cases three times, as many lbs. as shoats of 6 months weighing from 100 to 150. I have taken two pigs of 100 lbs. each, age six months, and never was able between May and November, to get them above 180, rarely above 170. I have taken 3 pigs of about 30 lbs. each, and on the same food which I gave to the two, they would weigh from 170 to 180 each in the same period; nay, I have taken pigs of 200, and never could get them to weigh more than 300 in 7 months on my food. The way I ascertain the quantity of food is, that I never give anything but the produce of my dairy, and the refuse of the garden, peaches, apples, and cabbage, which are uniform generally.

“ 3 pigs of 90 wt. or 30 wt. will give ordinarily.....	510lbs.
Less original wt. 90, often not more than 60	90
Gain	420
“ 2 pigs of 100 wt. each, will give ordinarily	340
Less original wt.....	200
Gain	140

“ ‘ But the three pigs of 90 will not consume for the first 3 months half so much as the two of 100 each, and I have kept a fourth and sold it in August for quarter pork.

“ ‘ There is nothing new or remarkable in these facts. It is the law of the whole animal creation. It is true of the calf and of man. The

child of 7 lbs. quadruples its weight in 12 months ; and the calf of 60 wt. if fine and well fed will weigh 600 wt. at the end of the year, and (if a female) will not double the last weight at any age.

“ P.S. It should be remarked that the weight at purchase is live weight, and at sale dead or net weight, because, in truth, to the owner this is the true mode of considering the subject. No doubt my sort of food is peculiarly favourable to young animals, it consisting in very liberal allowance of milk. If the older pigs were at once put on Indian meal they would attain to 250 lbs. at a year old, but the cost of the meal at 70 cts. per bushel would amount to 9 dollars, and if the first cost, 5 dollars 50 cents, be added, and the pigs sold at 6 cents, there would be but 2 dollars gain on 2 pigs of 100 lbs. each ; while 3 small pigs without meal, fed on milk, would give 24 dollars in the same time. I do not mean to give minute details, but general views. As an important qualification of the foregoing statement, it should be added, that shoats of 6 months bought out of droves have usually been stinted in their growth, and animals, like trees, recover slowly after a check. I presume if shoats were taken from a careful and liberal owner, the difference would be less. But as a general law it may be safely affirmed, that weight for weight at the purchase, the younger the animal, the greater the positive, and the far greater the net gain. At least such is my own experience and belief.’

“ Swine ought to be kept on every farm in sufficient numbers to consume all the offal and waste of the dairy and kitchen. If beyond this, a breed can be obtained, which will arrive at early maturity, and which can be advantageously grass-fed or kept at a small expense and in an improving condition through the summer ; and being put up to fatten early in autumn and forced as much as possible so as to be sent to market early in the winter, the farmer will ordinarily find a fair profit in this branch of husbandry. A great advantage is found in the keeping of swine from the valuable returns of manure both in quantity and quality, which are obtained from them, where care is taken to supply them with raw materials for the manufacture. Too much care cannot be bestowed in the selection of the breed and the general health of the animal when put up to feed ; and it is strongly recommended to every careful farmer occasionally to weigh the animal and measure the feed, that he may ascertain seasonably on which side the balance of debt or credit is likely to fall. Nothing is more prejudicial to good husbandry than mere guesses and random conjectures ; and though the result of our operations may not meet either our wishes or expectations, an intelligent mind will be always anxious as far as practicable to know precisely how far they correspond with or disappoint them.”

The Veterinarian. Longman and Co.: London.

This periodical maintains its reputation. The series of papers in the present number are of that practically useful kind which so generally distinguishes the publication. We make some extracts from a paper by Mr. W. Percivall, on "The Effects of Medicine on Horses." The paper is highly deserving of the attention of the veterinary student, as proving that, in medicine at any rate, "sauce for the goose" is not always "sauce for the gander;" and not only that, but as tending to lead the student into a train of reflection which cannot fail to produce useful philosophical and practical results.

While on this subject of medicine, we may throw out a hint to the veterinary student, though we do it in risk of having our ignorance thrown in our teeth.

Medicine is to remove disease. How does medicine remove disease? Is it by removing or by neutralizing the virus in the system, which is the cause of disease; or, by creating a fresh disease, and so inducing a neutral state; as, for instance, the chemical combination of sodium and chlorine, both poisons, produces common salt? And, in either case, what is the proper quantity and most efficient method of applying medicine?

We are of those who believe that all drugs have a more or less pernicious effect on the system; and, consequently, that no more of a drug should be administered than is strictly necessary. We also are inclined to believe that the administration of small doses at proper intervals, is the most effective method of attacking disease, and the least injurious to the system.

We should like to see this subject discussed in our pages: it is, in our opinion, a subject of great importance.

"Administered to horses, arsenic is no less certainly poisonous than to other animals; though enormous doses of the mineral have been, on some occasions, given, without such effects following as might, from its known efficacy, have been reasonably looked for. A horse suspected of having glanders, a patient of my father's, was, at the suggestion of Professor Coleman, submitted to the efficacy of arsenic given in powder, made up into balls with linseed meal and treacle. On the first day, a drachm was prescribed, and this dose was augmented by one scruple daily, for seventeen days, the horse consequently taking on the last day in one ball, six drachms and one scruple of the mineral; making the aggregate of his doses, seven ounces, six drachms, one scruple, or very nearly half a pound of arsenic in the course of the seventeen days, and

yet he never once refused his food, nor had any disturbance of his pulse or respiration, nor evinced any pain or uneasiness. From the progress his disease had made while under the experiment he was now destroyed. His stomach bore evidence of virulent inflammation, and its vascular lining was coated with coagulable lymph. The case constitutes one instance among many, where horses have shewn, after death, intense gastritis, without having, during life, evinced any symptom of the existence of such disease.

"The following experiment will show by how much less quantity of arsenic some horses will be affected even to destruction. Three horses having glanders were, after being subjected to treatment for their complaints, which had failed in affording them any relief, submitted to the operation of the common white arsenic. Five-grain doses were prescribed to be administered daily, in balls made up in the ordinary way. On the fourth day, one of them, having during the interval become sadly disordered from his glanders, was shot. On the fourth day after this—the eighth from the commencement of the experiment—the balls having, since the death of the other horse, been administered to the surviving two, morning and evening, one of them was attacked with shivering, loss of appetite, symptoms of great abdominal irritation, diarrhoea, prostration of strength, and imperceptibility of pulse. The other was also similarly affected on the day following. The latter, however, recovered, while the former died, poisoned by the arsenic. In the end the survivor was shot, on account of his disease having assumed the acute and incurable form.

"Here we have an example of little more than two scruples of arsenic producing gastro-enteritis to an extent that caused the death of one horse, and put in jeopardy the life of another. Idiosyncrasy, and other circumstances, unmentioned, unobserved, or unobservable, will, probably, be required to account for such strangely discrepant results. One fact, bearing on the explanation may, however, be mentioned here, and that is, the known difference, frequently coming under notice, between giving medicine in one large dose, and administering the same quantity in small or divided doses, at frequent intervals: it appearing, in the one case, that a large proportion of the medicine—especially of such a substance as arsenic, which is so sparingly soluble in water—passes out of the bowels unchanged, or, at all events, unabsorbed. Two ounces of cathartic mass, given in one dose, will be likely to purge a horse less violently and dangerously than a less quantity divided into drachm doses, and given at intervals of a few hours. I have frequently made the same observation in regard to mercury and

some other medicines. Indeed, among horse dealers it is a trite remark, that a dose of physic broken into three or four parts 'does a horse more good,' i. e., takes more effect upon him, 'than it would have done given in one dose.'

"No doubt, a great deal more medicine is given than comes into operation, the effects increasing nothing like in ratio with the dose; and that small doses are in general to be preferred, being more efficacious in proportion than large doses, providing they are given at short intervals, and for a length of time continued. In a case, or on an emergency where a certain palpable effect is required to be produced within a given time, there can be no question about the absolute necessity of administering a certain large or determined dose of medicine; but, when the case or circumstances are of a nature not to admit of immediate removal or palliation, on the contrary are such as can be benefited only by the gradual working of the remedy and the elapse of time, the system is in general more perfectly saturated with the medicine, and less harmlessly so, administered in minute doses at frequent intervals than in larger doses at longer intervals. I am, however, letting the consideration of this interesting point lead me away from my immediate subject—the medicinal properties of arsenic.

"I will here transcribe two cases from my Register, which will, I think, sufficiently elucidate the effects of arsenic in minute division in solution.

"CASE 1.—In March, 1813, a black horse, nine years old, in excellent condition, fine in his coat, very muscular, and having an appearance of being sound in constitution, with an appetite as good as that of any horse in perfect health, although the subject of glanders, was submitted to the operation of the same solution as was exhibited in the foregoing case.

"March 21st.—He took one drachm of the medicine in his pailful of water, and had the same repeated in the evening.

"22nd.—Two drachms of the solution twice a day.

"23rd and 24th.—Three drachms twice a day.

"25th, 26th, and 27th.—Half an ounce twice a day.

"28th.—Five drachms twice a day.

"29th, 30th, and 31st.—Six drachms twice a day.

"April 1st.—For the first time he refused his food; in consequence of which the dose was given but once on this day.

"2nd.—His appetite being amended, he took half an ounce twice a day.

"3rd.—He took five drachms twice a day.

" 4th, 5th, and 6th.—He took six drachms twice a day; though on the last day he again loathed his food.

" 7th.—He could not be induced to drink any of his water, and therefore seven drachms of the solution were mixed with a pint of water and administered as a drench.

" 8th.—The same drench was twice repeated, notwithstanding his appetite had again become fastidious.

" 9th.—Only 6 drachms were given morning and evening.

" 10th.—Being more off his feed, the dose was reduced to 3 drachms twice a day.

" 11th and 12th.—Only 2 drachms were administered twice a day.

" 13th.—The same dose was given but once.

" 14th.—His appetite having completely failed him, the medicine was discontinued. His pulse is 60, and he has visibly lost much flesh, being reduced, from a fat and fine-coated horse, to a thin rough-coated, unhealthy-looking animal. No effect appeared to have been produced by the arsenic on the glanders, but the disease made its usual progress.

" 18th.—The animal was destroyed. There is, unfortunately, no account of the post-mortem state.

" CASE II.—May, 1812. A horse, looking well in condition, and feeding well, with a pulse ranging between 40 and 50, and bowels in their natural state, but affected with glanders, having ulceration within both nostrils, and enlargement of the sub-maxillary lymphatic glands, was subjected to the operation of arsenic.

" May 16th.—The first dose administered was an ounce of a solution of arseniate of potash, in which was contained half a drachm of arsenic.*

" 17th.—Off his feed. Repeat the dose.

" 18th.—More off his feed; pulse 60. Repeat medicine.

" 19th.—Eats little or nothing; seems very sick. Continue the medicine.

" 20th.—Expressing a great deal of pain by pawing, gnawing his hay, &c.; respiration quickened and oppressed; failure of strength, manifested by staggering, and all but falling when he moves; pulse 90, and thready. Discontinue the medicine. At half-past 10, p.m., he died.

" The first circumstance noticed, on proceeding to make a post-mortem examination, was a most oppressive fætor proceeding from the

" * The Fowler's Solution employed in these experiments had, therefore, the strength of nearly four grains to the fluid drachm; whereas the *Liquor Arsenicalis* of the London Pharmacopœia contains but half a grain to the drachm."

cavity of the abdomen. The stomach exhibited no alteration upon its cuticular surface, but upon the villous existed a great deal of inflammation; and the inflammation appeared in spots or patches. In places where the reddening was most intense the texture of the tunic appeared softened and disorganized; and, in addition, the entire villous coat presented much increase of substance, or *thickening*. The inflammation extended into the duodenum, and also was, in places, apparent in the other small intestines; but as for the large intestines, the cæcum and colon at least, they were in a perfectly gangrenous condition. Their villous linings, particularly that of the blind pouch of the cæcum, were both black and rotten, owing, perhaps, to the lodgment and longer detention of the medicine in these parts. The liver was paler than usual; but otherwise without apparent change. The lungs were tuberculated, and in other respects showed the prior existence of disease. They were, however, in addition, greatly congested, and quite black, a condition partly ascribable to the hard death the animal died; but also, no doubt, owing to the arsenic—it being evident, from their odour, that they contained some of the same kind of gas which pervaded the abdominal cavity.

“The former of these cases exhibits a good example of what we may expect from arsenic in solution, given in over-doses—in doses such as the system cannot support. The latter one instructs us what doses are in general admissible; at the same time that it shows that the mineral possesses no anti-glanderian virtues whatsoever. From 1 to 4 drachms of a solution containing half a drachm of arsenic in a fluid ounce appears to be a safe or medium dose for a horse of sound constitution; and as, by long or frequent repetition, we may, even by such doses, in time, work mischief, it is a medicine whose administration should be narrowly watched. I have exhibited it in periodic ophthalmia, as well as glanders, but with no better success.”

The Sporting Magazine. Pittman: London.

The reader who fails in drawing amusement from this periodical, must, we imagine, be somewhat fastidious. For, while the sportsman may revel in spirit-stirring records of manly feats “by flood and field,” the general reader may receive equal pleasure from the various miscellaneous articles which are profusely scattered through its pages; and both be further gratified by the beautiful pictorial illustrations which invariably appear in each publication of this highly interesting work.

RESULTS OF GUANO.

*Mr. Robert Bell, to Mr. Wm. Danson, 36, John-street, Bedford-row,
London.*

DEAR SIR,

The further my experience extends in the use of guano, the more am I convinced of its efficacy as a manure of a permanent character for general purposes, a fact which could only be ascertained by time; and it was disputed if any crop sown on ground on which turnips, potatoes, &c., were raised from guano, would be benefited by its application to the preceding crop: however, I am glad to say that my barley and wheat crops, which succeeded turnips and potatoes on which I used guano, look equally as well, if not better, than where I used farm-yard manure to the previous crop of turnips and potatoes.

I firmly believe guano is suitable to *all* crops, and no farmer or gardener should be without a supply of it proportionate to the extent of land he occupies. As it will be found *useful at any season of the year*, for it will promote and improve the produce of crops at whatever stage of growth they may be when it is applied, but care must be taken that an over-dose is not given— $3\frac{1}{2}$ cwt. to the imperial acre should never be exceeded at one time. For grass land, I think, it is best in a liquid state,* and when put on meadows as soon as the crop is carried, its effects on the aftermath are astonishing, invariably insuring a second cutting, and not unfrequently a third.

I am, dear Sir,

Your obedient servant,

ROBERT BELL.

GUNSBORO', near Listowell, County of Kerry, 13th June, 1843.

SIR,

I was much struck with the account of guano results in the last three numbers of your Magazine, especially that of William Turner, Esq., of Haslingdon, in Lancashire, who is well known for his skill in the culture of tulips—his present bed of which is stated to be worth £3000—and for having a good lot of land in grass for his cattle and horses. It

* 1lb of guano may be put in 8 gallons of water, and let stand 24 hours—when 8 gallons more water may be added; which, after 48 hours, will be a valuable liquid for putting on land, or for horticultural purposes of every kind.

surprised me that Mr. Turner, who is a magistrate, a landed proprietor, an extensive manufacturer of flannel, &c., should lend his high authority to what I conceived to be mere puffing, and which I hate in publications of all sorts. It seemed incredible to me, that four-fold crops of grass could be had from such "bad fields," as I knew those belonging to Mr. T. to be, at the top of hills, where farm-yard manure could not be got, except at an enormous cost that would exceed the value of the land; and as such crops were attributed to the extraordinary properties of *guano* (a foreign article but little known here), I was determined to investigate such statements, and expose them if fallacious; but, on inquiry from Mr. Turner, and after viewing the land, to my great surprise I found them quite correct. The land now looks splendid, and has a second year's crop without any more manure whatever. As guano has got into great repute, and its merits regularly discussed at Rochdale every market-day, I have been induced to try it on five acres of my land, near this town, Wakefield, the great seat and place of sale for corn for all Yorkshire and Lincolnshire. The piece of land was the worst that could be conceived—quite barren; and I do assert, without fear of contradiction from all who have seen the land, that a crow could not have lived on it the year round; but now, after applying about 4 cwt. guano per statute acre this spring, costing me, at 12s. a cwt., £2 8s. per acre, I have a most luxuriant crop of grass on the said five acres—a crop, indeed, almost equal to any in Yorkshire; which is so astonishing to me as well as to my friends, that I think it only due to the farmers and proprietors generally to communicate this fact to you, in "Corroboration," as you note in your last April number, "of the Effects of Guano." I say it is wonderful! I shall be happy to show this crop to any person who will call on me; or to give any further particulars respecting it to any one who pleases to write to me. My guano must, of course, have been genuine, as I obtained it through Mr. Danson, my agent at Liverpool.—Yours, respectfully,

LAWRENCE HITCHON.

WAKEFIELD, 17th June, 1843.

N.B.—Mr. Turner and his friends round Rochdale, Burnley, Blackburn, &c. (most of whom I know), have used above 200 tons guano since February last; and, from all I can learn, they are equally satisfied.

EXPERIMENTS WITH GUANO.

The following experiments, as reported to the Highland and Agricultural Society, were made by J. Dudgeon, Esq., Spylaw, and were attended with so great success that this year that gentleman intends to put in 60 acres of turnips with guano. Mr. Dudgeon tested this manure by a trial against common farm-yard dung and bones. In his first experiment he tried the comparative value of dung and guano used in the following proportions, which shows the great advantage and saving of expense in guano :—

			Cwt.	st.
Two drills with guano,	5 cwt. per acre.....		25	5
Ditto with dung,	18 yds. ditto		18	7
Ditto with guano,	4 cwt. ditto		22	6
Ditto with dung,	18 yds. ditto		19	7
Ditto with guano,	3 cwt. ditto		20	6
Ditto with dung,	18 yds. ditto		14	2

Here, then, with guano at the rate of 3 cwt. per acre—or say, cost of manure £1 16s.—a heavier crop was taken up in October than was produced by 18 yards of good farm-yard dung, costing about £4; the cost of manure being as two to one in favour of guano.

The next experiment made was with bone-dust *v.* guano. The bones were mixed with ashes some days before being applied, in the proportion of 16 bushels of bones and eight of ashes per acre. The quantity of guano applied was at the rate of 3 cwt. per acre upon four drills, two and two together, at an interval of eight drills manured with bones and ashes. Then, at a smaller interval, followed two drills operated upon with guano, together with sulphate of soda (Glauber salts) at the rate of 4 cwt. per acre, being the only instance in the course of these experiments in which any foreign substance was used with the guano. The turnips were drawn about the end of November, and on a comparison of the weight of the crop on two or four drills done with guano alone, with the produce of the average of four drills nearly immediately adjoining, manured with bone-dust and ashes, the result stood thus (the plants being topped and rooted) :—

	Cwt.	st.
Guano	23	2
Bone-dust, &c.	19	2
Guano and sulphate of soda.....	23	0

In the third experiment guano was used against bone-dust alone, applied, as is usual in that district, at the rate of 16 bushels per acre. The guano was used at the rate of 2 cwt. only per acre. The drills

manured with the latter showed a very early superiority, and were ready for the hoe fully eight days earlier than the rest of the field. This more vigorous growth they maintained throughout, and when the turnips (the white stone globe variety) were weighed on the 22nd March, after standing throughout the winter, the result was as follows (the roots and tops being in this instance retained):—

	<i>Cwt. st.</i>
Two drills guano	31 4
Two ditto bone-dust	24 7

The result of this experiment is important. We find guano, costing say 25s. per acre, yielding *a larger crop than bones*, costing 35s. per acre—the increase being in proportion of 31 tons per acre in favour of guano, to 24 tons per acre raised by bone-dust, supposing the ground capable of raising such a crop.

Mr. Dudgeon had also used guano in top-dressing wheat on potato land, and the effect was most promising. Professor Liebig had seen some of these experiments, with which he expressed himself highly pleased.

One word practically as to bones and guano, and of the efficacy of any experiment to be made:—The farmer must see that he buys the genuine material. Let him buy from a first-rate dealer, who will warrant the manure genuine, and let him pay a fair value for it, or he need not be surprised *if he lose his crop*, all his rent, and what money he lays out for the adulterated cheap stuff. We by no means disparage artificial manures. Some of these are very good. But bones have been long tried, and proved to be of substantial benefit in agriculture. Their effect is lasting, and their chemical action as manure, will, we have no doubt, be greatly felt even in the breaking up of lands which, for years before, had been sown down after a turnip crop manured with bones. In this way we think it very unlikely that bones will be entirely given up, and guano substituted; while, however, we have as little doubt that guano will also be extensively and successfully used as a cheap and efficacious manure. Finally, as to guano: if the farmer is resolved to try it, let him see that he pays a fair price—that he get it from a respectable dealer, and in applying it to the ground with a turnip crop, he ought to have the manure nicely mixed with a certain proportion of ashes, to make it sow more easily; and, above all, the land should be thoroughly furrow-drained and worked with a subsoil plough, clean and pulverised, and the weather and ground dry when the manure is put in and the seed sown.—*Glasgow Herald*, June 12, 1843.

THE BRITISH FARMER'S MAGAZINE.

New Series.

VOL. VII.

OCTOBER, 1843.

NO. XXVII.

DERBY MEETING OF THE ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

CELEBRATION OF THE FIFTH ANNIVERSARY.

We lay before our readers a copious and detailed account of the proceedings of this great national gathering of the agriculturists of England. It is needless for us to dwell upon the importance attached to these meetings of the Royal Agricultural Society: the tens of thousands with which the town of Derby and its suburbs have been crowded during the week bear the most convincing testimony to the intense interest with which they are regarded, and indicate in no doubtful manner the vast and beneficial influence which the society exercises over everything connected with the development of the agricultural resources of the country. The most sanguine expectations of the members and friends of the Society, as to the manner in which the present meeting would go off, have (with one slight exception) been fully realised, and the proceedings appear to have given the most unbounded satisfaction, reflecting the highest possible credit upon the committee of management, the stewards of the various departments, the judges, and last, though not least, the indefatigable and worthy secretary of the Royal Agricultural Society, Mr. Hudson.

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DERBY.—TUESDAY.

The company have been arriving in immense numbers throughout the day, and the society, with a laudable view to the accommodation of visitors, has established an office for the registration of lodgings to be had throughout the town. There are upwards of 1600 lodgings registered at this office, in addition to the accommodation afforded by the inns and hotels, and those who have refused to register. The charges, however, are very high, as a suitable bed-room, even without a sitting-room, cannot be had under a guinea per night, and many persons have located themselves at Nottingham, Loughborough, and other adjacent towns, considering the travelling backwards and forwards by the railway as the least expensive plan. Notwithstanding this drawback the town is fast filling, and every hour adds to the number of the arrivals.

This morning the show of implements commenced, and this, therefore, may be considered as the first public day of the meeting, yesterday and Saturday having been employed by the stewards and judges in arranging the agricultural implements, and selecting those intended for trial. The implement yard was opened at eight o'clock.

In the selection of the implements for trial the society have been particularly anxious that their value and importance should be properly and amply tested, and for that purpose were desirous that the land, selected for the trial should be of that kind, with the cultivation of which the farmers of the county of Derby should be most familiarly acquainted. Land of this description has been accordingly selected under the superintendence of Mr Colville, M.P., and chairman of the local committee. It is situated at Mickleover, about six miles from Derby, and has been freely granted to the society by the occupier, Mr. John White, and by the owner, Mr. Shandos Pole, and offered in a perfect state of preparation, free of expense, by the town of Derby. Every necessary preparation has been completed, and it was this day found to be in the best possible state that strong land can be brought to. The council arranged that the trial at Mickleover should be for implements suited for heavy land, and that all such shall be selected by the stewards and judges, and forwarded to that place this day. The trial of the implements suited to light lands was arranged to take place at another locality; for which purpose the implements selected were taken this day to Coxbench, in the expectation that the trial would be made on the light land in the occupation of Mr. Chambers, but in consequence of unexpectedly large liabilities to which it was found the society would be subjected, and other difficulties, it was determined by the council and stewards that the trial of the whole should take place at Mickleover.

THE MAYOR'S DINNER TO THE COUNCIL OF THE SOCIETY.

This evening the Mayor, J. B. Crompton, Esq., gave a splendid entertainment at the Royal Hotel, to the members of the council. The dining-room was tastefully laid out for the occasion, and the dinner and wines not only reflected credit upon the well-known hospitality of the mayor, but also upon Mr. and Mrs. Huggins, who provided them.

On the removal of the cloth, the usual loyal toasts were given, and enthusiastically responded to by the company. The next toast was, "The Earl of Hardwicke, President of the Royal Agricultural Society."

The Earl of Hardwicke expressed the great pleasure he felt in being enabled, by the hospitality of their worthy host, to meet so distinguished a company as that which he saw around him. He congratulated the society and himself on the splendid display of agricultural machinery which the prizes offered by the society had this year brought forth, and expressed his confident hope that every year would develop fresh improvements, until our agriculture had reached that pitch of scientific perfection of which he believed it to be susceptible.

The Duke of Richmond, in brief and appropriate terms, proposed "The health of the Mayor."

The Mayor acknowledged the compliment, and said, it gave him great pleasure to entertain the council of the Royal Agricultural Society, and to forward the laudable objects for which it had been instituted.

The next toast was, "The Duke of Wellington and the Army," which was responded to by the Duke of Richmond.

The chairman then gave, "His Grace the Duke of Devonshire, lieutenant of the county."

The Duke of Devonshire was highly gratified by the compliment. Had the objects of the society been the promotion of, not agriculture, but its twin sister, horticulture, he might, as president of the Horticultural Society, have been able to descant more in detail on the various interesting objects which the exertions of those he saw around him had collected this year in Derby and its neighbourhood; but when he saw near him his noble friend the Duke of Richmond, himself a practical farmer, and better qualified than most men to give an opinion on agricultural subjects, he felt that any regret on the matter was unnecessary. The noble duke concluded by again thanking the company for the manner in which his health had been received.

The chairman then gave "The High Sheriff of the county," and Mr. Mundy, M.P., returned thanks.

which beds may be procured, and where the multitude may be fed. On entering the town from almost any quarter, the number of tents observable is almost incredible, and from most of them flags are streaming. Long rows of low wooden sheds are also to be seen covered with canvass, and very primitive-looking terraces they form among the new and unsubstantial tenements around them. This morning the judges proceeded to the cattle-yard to inspect the stock. The road leading to the yard was thronged with an immense concourse of people, all making to the great point of attraction, the exhibition ground. The cattle-yard has not yet been opened to the public; but hundreds were admitted into the implement-ground.

TRIAL OF IMPLEMENTS.

The human stream was next directed into a totally different channel. The scene of general interest was transferred to the very opposite quarter of the town; and as the hour appointed for the public trial of the implements drew near, the vicinity of the cattle and implement-yards was gradually forsaken. The implements designed for trial were selected by the stewards on Monday last from among the aggregate number which was then collected and arranged in the implement-yard; and none but those thus selected were permitted to approach the field. The Uttoxeter-road, which led to the field of trial, was literally lined with persons anxious to be present to witness the spectacle.

By twelve o'clock, the hour appointed for the commencement of the experiments, some thousands had collected upon the spot. There were several fields appropriated for the trial—each implement taking that for which it was particularly adapted. The first field was a ploughed one, in a rough state, and gave ample opportunity to the clod-crushers and scarifiers to test their respective capabilities. Of both these instruments there were several on the field, and differing in some points materially from each other in their construction. One ponderous clod-crusher was armed with a multitude of heavy cast-iron knives, placed in a zig-zag position to each other, enabling it first to cut the clod and then crush it with its weight. Others, constructed upon a different principle, seemed admirable implements for smoothing and breaking into small particles the roughest fallows. These latter had the additional recommendation of being capable, with a very little change, of being applied to the purpose of making grooves in the soil for the reception of seed. Crop renovators and drills were also examined and their powers tested, and seemed in every way well adapted for sowing any description of seed upon old or new turf.

PLOUGHING MATCH.

The field selected for the purpose of testing the different ploughs intended for trial, contained about 6 acres of very heavy soil. Different places were allotted to the various implements, and a little after the appointed hour, more than a dozen of them were at work. For some time the ploughing was inferior, and seemed to give general dissatisfaction to those most competent to judge. There were many difficulties, however, to be contended against. The ploughs used were generally light in their construction, more adapted for light soils than for the heavy land they were now turning up. The men, too, were most of them from the vicinity of Derby, and being accustomed to the ploughing of the heavy soil, seemed not quite at home in guiding implements adapted for lighter soils. To add to these drawbacks, the crowd upon the field would not be kept back, but constantly followed the various ploughs as they proceeded to open the furrows, trampling down the ground as soon as it was turned up, and preventing the horses from proceeding with that steadiness with which they otherwise might have advanced. The ground, too, besides being heavy, was rather stubborn and churly, as a farmer would say, and instead of turning sweetly over was too ready to break and crumble,—circumstances certainly not very favourable for a good display of this useful and important department of agricultural labour. However, as they continued, there was, in many cases, a manifest improvement. The wheeled ploughs, which were in a particular part of the field by themselves, seemed to answer much better than their competitors; but it must be remembered that those guiding them were more in the habit of using implements of this construction than of employing those without wheels. The experiments lasted altogether for more than a couple of hours, when the immense crowd wended its way back to Derby. A variety of other instruments were afterwards tried in another field—a strong clayey soil—comprising a variety of harrows (one of which had a rotary motion), horse-hoes, clod-crushers, sub-soil ploughs, &c. &c., but the crowds that surrounded them during their trial excluded nine-tenths of the spectators from obtaining even a glimpse of what they were capable of achieving. A variety of thrashing-machines, chaff-cutters, winnowing-machines, &c., were very satisfactorily tested in the farm-yard, by the aid of two steam-engines and horse mills. Notwithstanding the great disadvantage arising from the selection of the ground, the agriculturists were highly gratified by the novelty, variety, and excellence of many of the implements. It will not be transcending the bounds of truth to say that during the course of the afternoon, upwards of 10,000 persons were present.

THE DINNER OF THE COUNCIL OF THE SOCIETY

Took place at the County-hall this evening. The hall, which is capable of accommodating 400 or 500, was completely filled, and many gentlemen who came late were obliged to stand during the entire evening. Besides the noble and distinguished members of the council present, the company comprised the *élite* of the agricultural interest of Derbyshire and the neighbouring counties, and the representatives of many of the great manufacturing firms of the town and neighbourhood. Nothing could exceed the harmony that prevailed, nor the attention with which the instructive addresses of the various speakers were listened to. The exhortations to increased exertion and enterprise were warmly assented to, and each allusion to the identity of interest between agriculture and manufactures was responded to with a cordiality that could not be mistaken.

At five o'clock the chair was taken by the Earl of Hardwicke, president of the society, and the vice-chair by the Duke of Richmond.

The cloth having been removed, the noble chairman proposed the usual loyal toasts, speaking in terms of deserved eulogy of several of the members of the royal family. The toasts were drunk with the customary enthusiasm of Englishmen. The chairman then said the awards not having yet arrived, it became necessary to alter the arrangement of the toasts. He should therefore call on Mr. Strutt.

Mr. Strutt, M.P., expressed his regret that the noble chairman had not called on one more able to obey his commands. The only excuse he could offer was, that having been called on by the president, it was the duty of every one, who wished well to the society, to do all in their power to forward its objects. The great object of agriculture was to stimulate the fructifying powers of the earth. To carry out that purpose an analysis of the soil was necessary, and therefore it must be obvious that the science of the geologist and of the chemist must be most valuable aids to the farmer. Agriculturists might understand the routine of their business; but it could not be expected that they could have the knowledge of scientific men; while scientific men might discover valuable principles in theory, but might not have the means of carrying out those theories into practice. It was, therefore, one great advantage of a society like this, that, through meetings like the present, and through the publication of its transactions, scientific men were able to put forth their valuable suggestions, while the men of practice carried them into effect. Mr. Strutt concluded by proposing "The healths of Dr. Buckland and the other distinguished professors present."

Mr. Buckland was understood to say that he gladly undertook the task of returning thanks on behalf of the professors of science then present. He was sure that not only his brother professors present, but those who, while absent, were actively engaged in furthering the interests of the society, would never be deficient in zeal and in the wish to assist the cultivators of the land in increasing its powers of production. The time had now come when the cultivators of the soil did not turn a deaf ear to the advice of men of science. They had lived to see the time when the cultivator of the soil was no longer an ignorant individual, following in the steps of his forefathers, and not daring to go beyond them. They had lived to see the day when the discoveries of men of science were disseminated over the length and breadth of the land. He would not occupy their time by predicting what the labours of the geologist might effect in the next few years. At present he thought their attention should be directed to the exertions of the chemist. The value of those exertions they could appreciate from the letters of Professor Henslow. They had all read his letters to the farmers of England, and many of them were carrying out his suggestions. They had also seen the letters of Professor Daubeny, and were no doubt familiar with what had been going on in the University of Durham. For twelve months past Professor Johnston had been delivering lectures there to the farmers of the county, which lectures had been published, and were now in course of circulation throughout the country. Another science which had of late years been brought to bear on agriculture, was physiology. In December last Dr. Playfair had told the farmers, that not only was chemistry subsidiary to that important branch of agriculture, the fattening of cattle, but that physiology bore in an important degree on those results. They now saw before them Professor Owen, who had lately received a valuable mark of the favour of his sovereign. He (Dr. Buckland) was happy to have to announce to the meeting that that distinguished man was ready to co-operate with Professor Playfair in investigating the application of physiology to the fattening of cattle. They had now arrived at a time when the agriculturist was athirst and longing for the experiments of the chemist, in order that the scientific farmer—and he was proud to say that now thousands deserved the name—might know something of the materials with which he had to deal. He had been informed, on high chemical authority, that the analyses of wheat and barley and of the stems of plants and grass were very imperfect, and they all knew that the great agricultural desideratum was a knowledge of the constituent parts of

plants. He had heard it stated, at a meeting of the society at Cambridge, that there were means of ameliorating the soil by transporting marl and clay from one part of the estate to another, and it was thence boasted that the farmers would not require the aid of foreign manure. It had been said that the best manure was the produce of the farm-yard; he was ready to admit that nothing was comparable to it. Their noble chairman knew that Lord Ducie, who had reached the maximum of perfection in farming, never laid out one sixpence in the purchase of foreign manure. But every man of sense must know that Lord Ducie had begun by an enormous outlay of capital, and that his farm was situated in the vicinity of a great city; the produce of his farm-yard would not have manured the tenth part of his land. Therefore he (Dr. Buckland) asserted, that the chemist for the next four years, and the geologist for five years after, would be doing important service by pointing out to the farmer the ingredients of which land and corn were composed. He looked upon it as a consummation that many present might live to see, *when double the present production would be attained*. But there was another desideratum to be attained before the scientific application of manure would be successful. They must prepare the land for its reception. *They must alluviate, drain, and dry it*. The best lands would produce two-thirds more if properly drained, and that being done they must apply the subsoil plough; but if they applied the subsoil plough without drainage, they would do more harm than if they had neglected the land altogether. Dr. Buckland concluded by thanking them for the manner in which his name and those of his brother professors had been received.

The chairman then read the following awards:—

SHORT HORNS.

Judges.—Mr. Jesse Kemp, of Utterby Grove; Mr. John Godfrey, of Cottesmore; Mr. W. Jones, of Sheep House.

CLASS I.

The first prize of thirty sovereigns for the best bull calved previously to the 1st January, 1841, to W. Barnard, M.P., of Gosfield Hall, Halstead, Essex, for his 3 years and 3 months old short-horned bull, bred by the Earl Spencer, at Wiseton, near Bawtry, Nottinghamshire.

The second prize of 15 sovereigns to Mr. John Forrest, of Stretton, Cheshire, near Warrington, for his 4 years and 4 months old short-horned bull, bred by himself.

CLASS II.

The prize of 20 sovereigns for the best bull, to Mr. John Cooper, of Monkwood, Thurgaston, Nottinghamshire, for his 2 years 1 month and 1 day old short-horned bull, bred by himself.

CLASS III.

The prize of 15 sovereigns, for the best cow in milk, to Mr. Thomas Crofton, of Holywell, near Durham, for his 4 years and 2 months old short-horned cow, bred by Mr. John Colling, of Whitehouse.

CLASS IV.

The prize of 15 sovereigns for the best in-calf heifer not exceeding 3 years old, to Mr. Thomas Crofton, of Holywell, near Durham, for his 2 years and 11 months old short-horned in-calf heifer, bred by himself.

CLASS V.

The prize of 10 sovereigns for the best yearling heifer, to Mr. Henry Watson, of Wolkeringham, near Bawtry, for his 1 year and 10 months old short-horned yearling heifer, bred by himself.

HEREFORDS.

Judges.—*Mr. Thomas Chapman, of Stoneleigh; Mr. J. Buckley, of Alithwaite; Mr. W. Trinder, of Wantage.*

CLASS I.

The first prize of 30 sovereigns for the best bull calved previously to the 1st January, 1841, to Mr. Thomas Jefferies, of the Grove, Pembridge, for his 3 years 8 months and 3 days old Hereford bull, bred by himself.

The second prize of 15 sovereigns in class one, to Messrs. John Walker, of Burton, near Worcester, and John Johnson, of Hampton Wafle, near Bromyard, for their 2 years 7 months and 13 days old Hereford bull, bred by Mr. Duppa, of Puddleston.

CLASS II.

The prize of 20 sovereigns for the best bull calved since the 1st January, 1841, and more than one year old, to Mr. William Perry, of Monkland, near Leominster, for his one year 7 months and 16 days old Hereford bull, bred by himself.

CLASS III.

The prize of 15 sovereigns for the best cow in milk, to Mr. Thomas Jefferies, of the Grove, Pembridge, for his 3 years and 8 months old Hereford cow, bred by himself.

CLASS IV.

The prize of 15 sovereigns for the best in-calf heifer, not exceeding 3 years old, to Mr. John Walker, of Burton, near Worcester, for his 2 years 5 months and 2 weeks old Hereford in-calf heifer, bred by himself.

CLASS V.

The prize of 10 sovereigns for the best yearling heifer, to Mr. Thomas Jefferies, of the Grove, Pembridge, for his 1 year 6 months and 1 day old Hereford yearling heifer, bred by himself.

DEVONS.

Judges.—*Mr. Thomas Cooper, of Norton; Mr. Edward L. Franklin, of Ascott; Mr. John King, of Brighton.*

CLASS I.

The first prize of 30 sovereigns for the best bull calved previously to the 1st January, 1841, to Mr. George Turner, of Barton, near Exeter, for his 3 years and 3 months old Devon bull, bred by himself.

The second prize of 15 sovereigns, to Mr. Thomas Umbers, of Wappenbury, near Royal Leamington Spa, for his 3 years and 3 months old Devon bull, bred by Mr. Quartley, of Molland, North Moulton, Devon.

CLASS II.

The prize of 20 sovereigns for the best bull calved since the 1st January, 1841, and more than one year old, to Mr. Thomas Reynolds, of Thomerton, near Exeter, for his 1 year 42 weeks and 5 days old Devon bull, bred by himself.

CLASS III.

The prize of 15 sovereigns for the best cow in milk, to Mr. George Turner, of Barton, near Exeter, for his 6 years and 2 months old Devon cow.

CLASS IV.

The prize of 15 sovereigns for the best in-calf heifer, not exceeding 3 years old, to Mr. George Turner, of Barton, near Exeter, for his 2 years and 4 months old Devon in-calf heifer, bred by himself.

CLASS V.

The prize of 10 sovereigns for the best yearling heifer, to Mr. George Turner, of Barton, near Exeter, for his 1 year and 4 months old Devon yearling heifer, bred by himself.

ANY BREED OR CROSS CATTLE,

NOT QUALIFIED TO COMPETE AS SHORT HORNS, HEREFORDS, OR DEVONS.

Judges.—*Mr. John Hall, of Wiseton; Mr. Phillip Chasemore, of Horsham; Mr. William Smith, of West Rasen.*

CLASS I.

The first prize of 30 sovereigns for the best bull calved previously to the 1st January, 1841, to Mr. James Hextall, of Snibstone, Ashby-de-la-Zouch, for his 3 year and 6 months old pure long-horned bull, bred by Mr. John Dean, of Ibstock.

The second prize of 15 sovereigns, to Mr. William Daniel, of Burton-upon-Trent, for his 3 years and 5 months old long-horned bull, bred by himself.

CLASS III.

The prize of 15 sovereigns for the best cow in milk, to Mr. Edward Pratt, Caldwell, Burton-upon-Trent, for his 9 years and 3 months old pure long-horned cow, bred by Mr. Minion, of Statfold, near Tamworth.

CLASS IV.

The prize of 15 sovereigns for the best in-calf heifer, not exceeding 3 years old, to his Grace the Duke of Buckingham, of Stowe, near Buckingham, for his Grace's 2 years and 11 months old pure long-horned in-calf heifer, bred by himself.

CLASS V.

The prize of 10 sovereigns for the best yearling heifer, to the Rev. Cornelius Thompson, of Elkesley, near East Redford, for his 1 year and 4 months old Ayrshire and short-horned cross-bred yearling heifer, bred by himself.

LEICESTER SHEEP.

Judges.—Mr. Jonathan Clarke, of Weedon; Mr. Richard Hewitt, of Dodford;
Mr. Thomas Metcalf, of Harleston Park.

CLASS I.

The first prize of 30 sovereigns for the best shearling ram, to Mr. Thos. E. Pawlett, of Beeston, near Biggleswade, Bedfordshire, for his 17 months old Leicester ram, bred by himself.

The second prize of 15 sovereigns, to Mr. Thomas E. Pawlett, of Beeston, near Biggleswade, Bedfordshire, for his 17 months old Leicester ram, bred by himself.

CLASS II.

The first prize of 30 sovereigns for the best ram of any age above 2 years old, to Mr. Thomas Stone, of Barrow on Soar, for his 40 months old Leicester ram, bred by himself.

The second prize of 15 sovereigns, to Mr. Thomas Stone, of Barrow-on-Soar, for his 52 months old Leicester ram, bred by himself.

CLASS III.

The first prize of 10 sovereigns for the best pen of five shearling ewes, to Sir William B. Cook, Bart., of Wheatley, near Doncaster, for his five 15½ months old Leicester ewes, bred by himself.

SHORT WOOLLED SHEEP.

Judges.—Mr. Edward Pope, of Great Toller; Mr. William Stace, of Bervick;
Mr. William Arkoll, of Langney.

CLASS I.

The first prize of 30 sovereigns for the best shearling ram, to Mr. Jonas Webb, of Babraham, near Cambridge, for his 16 months old Southdown ram, bred by himself.

The second prize of 15 sovereigns, to Mr. Jonas Webb, of Babraham, near Cambridge, for his 16 months old Southdown ram, bred by himself.

CLASS II.

The first prize of 30 sovereigns for the best ram of any age above 2 years old, to Mr. William Sainsbury, of West Lavington, near Devizes, for his 29 months old Southdown ram, bred by himself.

The second prize of 15 sovereigns, to Mr. Jonas Webb, of Babraham, near Cambridge, for his 40 months old Southdown ram, bred by himself.

CLASS III.

The first prize of 10 sovereigns for the best pen of five shearling ewes, to Mr. Samuel Webb, of Babraham, near Cambridge, for his five 16 months old Southdown ewes, bred by himself.

The second prize of 5 sovereigns, to his Grace the Duke of Richmond, for his five 16 months old Southdown ewes, bred by himself, at Goodwood, near Chichester.

LONG WOOLLED SHEEP,

NOT QUALIFIED TO COMPETE AS LEICESTERS.

Judges.—Mr. William Gillet, of Stoneleigh; Mr. John Harris, of Hilton;
Mr. John Elliot, of Chapel Brampton.

CLASS I.

The first prize of 30 sovereigns for the best shearling ram, to Mr. Edward Smith, of Charlbury, Oxon, for his 15½ months old Oxfordshire ram, bred by himself.

The second prize of 15 sovereigns, to the Executors of the late Mr. William Faulkner, of Bury Barns, near Burford, Oxon, for the 15 months old improved Oxfordshire ram, bred by himself.

CLASS II.

The first prize of 30 sovereigns for rams of any age above 2 years old, to Mr. Edward Smith, of Charlbury, Oxon, for his 51½ months old Oxfordshire ram, bred by himself.

The second prize of 15 sovereigns, to Mr. Edward Smith, of Charlbury, for his 51 months old Oxfordshire ram, bred by himself.

CLASS III.

The first prize of 10 sovereigns for the best pen of five shearling ewes, to Mr. Charles Large, of Broadwell, near Burford, for his five 16 months old New Oxfordshire ewes, bred by himself.

The second prize of five sovereigns, to Mr. Edward Smith, of Charlbury, Oxon, for his five 15½ months old Oxfordshire ewes, bred by himself.

PIGS.

Judges.—Mr. John Farncomb, of Brighton; Mr. Tawney, of Oxford;
Mr. Owen Cambridge, of Wimpole.

CLASS I.

The first prize of 10 sovereigns for the best boar of the large breed, to Mr. Moses Cartwright, of Stanton House, near Burton-on-Trent, for his 1 year and 9 months old boar, bred by himself.

The second prize of 5 sovereigns, to Mr. Pusey, M.P., of Pusey, near Farrington, for his one year and 2 months old Berkshire boar, bred by Mr. John Harris, of Hinton.

CLASS II.

The first prize of 10 sovereigns, for the best boar of the small breed, to Mr. Wm. Fisher Hobbs, Marks Hall, Coggeshall, for his 10 months old improved Essex boar, bred by himself.

The second prize of 5 sovereigns, to Mr. Thomas Atkin, of Grendon, near Atherstone, for his 1 year old boar, bred by himself.

CLASS III.

The prize of 10 sovereigns for the best sow of a large breed, to His Grace the Duke of Devonshire, for his 2 years and 4 months old Lincolnshire sow, bred by Mr. Gratton, of Swarby, Lincolnshire.

CLASS IV.

The prize of 10 sovereigns for the best sow of a small breed, to Mr. Thomas B. Shilcock, of Hose, near Melton Mowbray, for his 2 years and 10 months old cross-bred sow, bred by himself.

CLASS V.

The prize of 10 sovereigns for the best pen of three breeding sows, to Mr. Wm. F. Hobbs, of Coggeshall, for his 8 months old improved Essex pigs, bred by himself.

EXTRA STOCK.

The judges award £2 to Mr. R. Burgess, of Cotsgrove place, near Nottingham, for his 9 months old Durham heifer; £3 to Mr. William Worthington, of Newton-park, Burton-on-Trent, for his 4 years old short-horned heifer; £5 to the Hon. Mr. Wilson, of Diddlington, near Brandon, for his 2 years and 6 months old Ayrshire and short-horned heifer; £2 to Mr. T. Harris, of Fletchamptstead, for his 17 months old Leicester ram; £3 to Mr. Watkins, of Ormsby, for his 52 months old fat ewe; £3 10s. to Mr. Watkins, of Ormsby, for his 40 months old fat ewe; £2 to Mr. Harris, of Fletchamptstead, for his 17 months old Leicester ram; 30s. to Mr. Harris, of Fletchamptstead, for his 17 months old Leicester ram; £2 10s. to Mr. John Buckley, jun., for his 7½ months old sow; £2 to Mr. Wiley, of Brandsby, for his 2 years and 6 months old sow, £3 for his 6 months and two weeks old sow pig, and £5 for his 6 months and two weeks old sow pig.

The noble chairman then gave "The health of the successful competitors." He said he felt deeply the value of such men as those who had received the prizes—men who would not be lightly estimated in any country, much less in any country like this, whose population

was increasing from year to year, even from day to day, in the ratio of a thousand. Another reason why such farmers as devoted their time to the improvement of stock deserved well of their country was, that in times of depreciation superior stock suffered nothing from the fall in price. He had been some time previously present at a sale of stock in his own county, when, notwithstanding the general depreciation of price, the superior stock fetched not only as good, but a better price than had previously been obtained. There was a gentleman present (Mr. Jonas Webb) who, at his last annual show of rams, was enabled to obtain a better price than previously. His lordship concluded by proposing "The healths of the successful competitors for stock, especially that of Mr. Turner, the most successful."

The next toast was "The successful competitors for sheep and other farming stock, horses, pigs, &c."

His Grace the Duke of Richmond rose to return thanks, and was received with long protracted cheering. He had hoped that some competitor more successful than himself would have risen to return thanks, but as none had done so, and as he had been declared a successful competitor for sheep, it became his duty to thank the company for the compliment they had just paid him. He owned he should have been better pleased if he could have risen as the successful competitor in some higher class. He understood that he had been successful in his yearling ewes, but the fact was, that he paid more attention to his young than to his old stock, and he thought he might reasonably hope that, if successful in his young stock this year, he might succeed in his old stock the next. He did not feel justified in trespassing much upon their attention, but he trusted he might be allowed to allude to the magnificent show of implements they had witnessed that morning. He would merely add, that he never rose with more pleasure than when the object was to return thanks for the successful competitors in agricultural pursuits, the more especially as he had often had to return thanks on behalf of the unsuccessful candidates. He had always recommended those who found themselves in that position to persevere, and they would certainly have at last to return thanks as successful competitors. He could not but thank the meeting for the manner in which they had received him, and his fervent hope was that he might never deserve to be received by the farmers of England in any other manner.

The chairman then proposed "The Marquis of Northampton, President of the Royal Society."

The Marquis of Northampton, in returning thanks, expressed the

great pleasure he felt in being present at such a meeting. He felt, that as President of the Royal Society, it was his duty to pay a tribute to that most important of sciences—agriculture. It was, in fact, connected with all sciences. What, for instance, was the scientific breeding of stock but animal physiology—what was the growth of corn but botany? The meeting knew how intimately these two sciences were connected with all the other sciences. Meetings like the present, while calculated to promote good feeling, tended also to promote a laudable rivalry among agriculturists, which could not but advance their common good. It had been well said that he was a benefactor to his country who made two ears of corn grow where one had grown before, and all must allow that that was among the objects of the Royal Agricultural Society.

The chairman then read the following

AWARDS FOR IMPLEMENTS.

To Messrs J. R. and A. Ransome, of Ipswich, for their exhibition in general, the gold medal; a silver medal for their patent machine for making tiles and bricks, by severing the clay with wires, and for the peculiar mode of taking them away and separating; and a silver medal for their patent iron-trussed whippetrees and pomeltrees.

A machine for heating a preparation of gas tar, invented by C. R. Colville, manufactured Mr. John Harrison, of Derby, silver medal.

A patent rick ventilator, invented by John Gillett, of Bralles, manufactured by Lovett, of Shipston-on-Stour, silver medal.

A subsoil pulveriser, invented by the Hon. M. W. B. Nugent, of Higham Grange, Hinckley, manufactured by Richard Clyburn, of Uley, near Dursley; with additions by John Morton, of Chester Hill, silver medal.

A patent chaff-cutter, with two spiral knives, invented by the Earl of Ducie, R. Clyburn, and E. Budding, of Tortworth, Uley, near Dursley, £10.

A corn crusher, invented and manufactured by Richard Clyburn, of Uley, near Dursley, silver medal.

A corn meter, invented by John Norton, of Chester Hill, manufactured by Richard Clyburn, of Uley, near Dursley, silver medal.

An improved drain level, invented by Andrew Notman, of Painswick, manufactured by Richard Clyburn, of Uley, near Dursley, silver medal.

A winnowing machine, invented and manufactured by Mr. John Newham, of Kegworth, near Loughborough, Leicestershire, silver medal.

An implement for draining, invented and manufactured by Mr. David Harkes, of Mere, near Knutsford, Cheshire, £10.

A hand-making drain tile machine, invented by the Marquis of Tweeddale, of East Lothian, manufactured by Robert Bridges, of North Berwick, silver medal.

An iron skim for paring stubble, invented by J. Allen Stokes, Havington, near Evesham, manufactured by Edward Hill, Brierly Hill Iron Works, near Dudley, £3.

An iron cow crib, with roof, invented by Edward Hill, Brierly Hill Iron Works, near Dudley, and manufactured by himself, £3.

An iron sheep-rack upon wheels, with roof and trough, invented by Edward Hill, of Brierly Hill Iron Works, near Dudley, and manufactured by himself, £3.

A harrow, invented and manufactured by Mr. Robert Hobkin, of Hartington, near Ashborne, Derbyshire, £5.

A machine for dressing corn, invented and manufactured by Bryan Millington, of Asgarby, £5.

A land presser, invented, improved, and manufactured by John Caborn, of Denton, near Grantham, £10.

A corn and turnip drill, invented, improved, and manufactured by John Caborn, of Denton, near Grantham, silver medal.

A boat plough, manufactured by John Caborn, of Denton, near Grantham, silver medal.

A patent grass-land cultivator and grass drill, invented and manufactured by Mr. Crossekill, of the Iron Works, Beverly, Yorkshire, silver medal.

One pair new invented cart wheels, made by machinery, with cast-iron naves, turned-up axles and hook, manufactured by W. Crosskill, silver medal.

A 12-coulter drill machine for general purposes, invented and manufactured by Richard Hornsby, of Spittlegate, near Grantham, £10.

A 30-coulter small seed drill, invented and manufactured by Richard Hornsby, Spittlegate, near Grantham, silver medal.

New implement, invented and manufactured by Richard Hornsby, Spittlegate, near Grantham, silver medal.

A cake crusher, invented and manufactured by Richard Hornsby, of Spittlegate, Grantham, £5.

A combined drag harrow and scarifier, invented and manufactured by Joseph Miller, of Barnethy-le-Wold, silver medal.

New implement, viz., a plough with subsoil apparatus attached, invented and manufactured by John Bruce, of Teddington, near Stratford-on-Avon, £5.

A drill for drilling turnips on ridges, invented and manufactured by Thomas Hunter, of Ulceby, near Barrow-on-Humber, £5.

Four-horse power thrashing machine, invented by R. Garratt, of Leiston Works, manufactured by R. Garratt and Son, £30.

Patent horse hoe, invented by R. Garratt, of Leiston Works, manufactured and patented by R. Garratt and Son, silver medal.

Chaff machine, fitted in an iron frame, invented by Mr. James Smith, of Gloucester, £3.

Self-acting cheese press, invented and manufactured by J. Smith, £3.

New implement, viz., a stack covering to supersede thatching, invented by George Parsons, of West Lambrook, manufactured by his own carpenter and smith, silver medal.

Oat and bean mill, improved and manufactured by James Spencer, of Hopton, near Wirksworth, Derbyshire, £5.

Spring wagon, with patent breaks, the breaks invented by Charles Thatcher, of Midsomer Norton, manufactured by Richard Stratton, of Bristol, £20.

Low manure cart, with cranked axle, invented and manufactured by Richard Stratton, of Bristol, silver medal.

New implement, viz., a revolving cooch-rake, invented and manufactured by Richard Stratton, of Bristol, £2.

Double cheese press, invented by Mr. Gingell, of Bristol, manufactured by R. Stratton, £3.

Pair of oil-box iron stocks, with axle arms, invented and manufactured by R. Stratton, £10.

Scotch farm cart, with the patent break, invented by Charles Thatcher, of Midsomer Norton, manufactured by R. Stratton, of Bristol, and others of the patentees' licensees, silver medal.

New implement, viz., a subsoil plough, invented and manufactured by Hugh Carson, of Warminster, Wiltshire, £10.

Set of patent four-beam iron harrows, invented by Wm. Armstrong, manufactured by John Howard, £5.

An improved steam apparatus for roots, &c, invented and manufactured by James Richmond, of Salford, near Manchester, £5.

Corn and seed drill, James Smith, of Peasenhall, near Yoxford, invented by Messrs. Smith and Son, manufactured by James Smith, jun., £5.

Biddell's scarifier, Messrs. J. R. and A. Ransome, of Ipswich, invented by Arthur Biddell, of Playford, manufactured by themselves, gold medal.

New implement, a patent machine for making tiles and bricks, Messrs. Ransome, Ipswich, invented by R. Beart, of Godmanchester, with additions by A. Hickney, of Ridgmont, manufactured by themselves, silver medal.

A horse hoe, with lever rake attached for cleansing turnips and potatoes, invented and manufactured by Mr. J. Scurrah, of Crakehall, near Bertall, Yorkshire, £3.

Patent steerage lever horse-shoe, invented and manufactured by Mr. J. C. Grant, of Stamford, Lincolnshire, a silver medal.

New implement for hummelling barley, invented and manufactured by Mr. Joshua Crooch, of Harleston, near Northampton, £3.

Newly improved hay-making machine, invented and manufactured by Thomas Wedlake, of Hornchurch, near Romford, Essex, silver medal.

Newly invented turnip cutter, invented and manufactured by Thomas Wedlake, of Hornchurch, near Romford, Essex, £2.

Corn-delivering carriage on springs, for general purposes of road and field, invented

and manufactured by A. White, of Old Sleaford, near New Sleaford, Lincolnshire, £10.

Portable steam-engine, improved and manufactured by Wm. Cambridge, of Market-Lavington, near Devizes, £10.

Agricultural carriage, invented and manufactured by Daniel Coombes, of Shipton, near Burford, Oxon, £5.

Four-horse steam-engine on wheels, with shafts complete for travelling, invented and manufactured by Alexander Dean, of Birmingham, £10.

The Bretforton cider-mill, suitable for one or two horses, hand-power, &c, invented by James Ashwid, Esq., of Bretforton, Worcestershire, manufactured exclusively by A. Dean, silver medal.

Weed and bush extractor, invented by Joseph Hall, manufactured by Hall & Co., £2.

Liquid manure-drill, invented and manufactured by Thos. Huckvale, of Over-Norton, near Chipping-Norton, £5.

Patent weighing-machine for cattle, invented by Monsieur George, of Paris, manufactured by H. G. James, London, £10.

Set of strong patent iron harrows, invented and manufactured by Sandars and Williams, of Bedford, £5.

A churn, invented by Thomas Wood, manufactured by W. Wood, £5.

Dibbler, invented by G. Cottam, and manufactured by Cottam and Hallen, of Winsley Street, London, £2.

Chain-harrow with serrated rings, invented by G. Cottam, and manufactured by Cottam and Hallen, London, silver medal.

Some draining-tiles, pipes, sewer-pipes, and wall-coping, invented and manufactured by F. W. Etheredge, of the Woodlands, near Southampton, silver medal.

A map in relief, of a district, with instruments, invented and manufactured by J. R. Denton, of Southampton, silver medal.

A cast-iron thrawl, or stillion, invented by William Hutchinson, of Derby, and manufactured by James Haywood, of Derby, £2.

A new drain and subsoil plough, invented and manufactured by J. Read, of 35, Regent Circus, London, silver medal.

The chairman then gave "The Successful Competitors in Implements." He was, glad to be able to congratulate the society on the exhibition they had that day witnessed, and he would venture to assert that in the world it could not be exceeded. It had been asserted that the introduction of machinery was calculated to injure the labouring population—he utterly denied that assertion. It had been proved to demonstration that, so far from that being the case, the opposite was the fact. It was impossible to impede the progress of science—you dare not attempt it: if you did, it would master you, and bear you down. The proper way of treating it, then, was to avail yourselves of the advantages it offered. Would any one tell him, that the use of the drill had injured the labouring man? No; it required additional labour in other branches. Would any one say that the thrashing-machine diminished the demand for labour? On the contrary, by late improvements, it had transferred the labour from the horse to the man. They might soon sell their horses, as the improved thrashing-machines would be worked by men. He repeated, then, that it would be vain to attempt arresting the progress of science. With these views, he had great pleasure in proposing the healths of the inventors of implements.

Mr. Ransome, of Ipswich, returned thanks on the part of the agricultural implement makers; he trusted that through the medium of mechanics great improvements would be effected in agriculture. The great success of our manufacturers had been produced by contrivances to lessen the cost and increase the power of production. How much more important would it be to bring mechanical ingenuity to bear on the production of food for man! He denied that improvements in machinery lessened the demand for labour, but asserted, on the contrary, that those who employed most machinery employed most manual labour. He begged now to say a few words on a matter interesting to himself and his brother implement makers. They had been summoned from all parts to submit their implements to the inspection of the society, and having so brought them, he thought they were entitled to have a full and efficient test. They did not come there as showmen, to contribute to the amusement of the visitors; they came in order to further the prospects of the society. They cared little for the £20 prize, or the gold medal, if not obtained after the value of their implements had been fully tested. It was not to be expected that farmers could understand mechanical combinations; they could only judge of the value of an agricultural implement by seeing how it worked; and therefore it was he complained that there had not been means of sufficiently testing the implements. Mr. Ransome, in conclusion, repeated his acknowledgments for the honour which had been done him and his brother implement makers.

The chairman called on Earl Spencer to propose a toast.

Earl Spencer rose, and was received with the most enthusiastic cheering. He said he rose to propose a toast which gave him great pleasure, namely, "The judges of cattle who had acted on that day." He (Earl Spencer) had been with them while exercising their judgment, and he could bear testimony to the care they had taken and the impartiality they had evinced. They had heard of the great display of implements which had been exhibited on that day. He would not say that the show of cattle was equal to that of implements, but certainly it exceeded that of any former meeting. He was very much gratified by the discussion which the present meeting had elicited, and more particularly with the observations of the gentleman who had just sat down. He was glad that that gentleman had spoken, as he (Earl Spencer) had frequently made the complaint himself that the implements had not had a fair trial. He completely concurred with that gentleman in thinking that the implements should have a fair field. It was therefore an important matter

that the best possible arrangement should be made for the trial of implements. With respect to the assistance the farmers were receiving from men of science, no man held it higher than himself, and he certainly looked forward to greater advantages from it than any that had been yet obtained. If they were to compare the rude implements which had been in general use a few years previously, and which were yet, he was sorry to say, in use in some parts of the country, with the recently-invented instruments, they would see of what enormous advantage mechanical science had been to agriculture. He confessed he looked on it as a most important aid to agriculture. The noble earl concluded by proposing "The healths of the judges of cattle."

Professor Owen, in returning thanks, stated that the agricultural interest were deeply indebted to Earl Spencer for a most interesting discovery in animal physiology. It had sometimes been asserted that prize cattle were in a diseased state, but the fact was, that their power of accumulating flesh was the surest proof of health. He trusted that sound principles would soon prevail in the entire agriculture of England. He felt very grateful for the notice of the toast, and he could assure them that the judges had endeavoured impartially to discharge their duty.

The next toast was "Agriculture all over the world."

Mr. Coleman, an American gentleman, rose to return thanks. He felt most grateful for the welcome which he had everywhere received from Englishmen since his arrival in this country. He fully joined in the admiration that the exhibition of implements had excited, but he regretted that among them there was not one which would enable a man to make an effective dinner speech. He hoped that the eminent mechanics he saw round the table would hit upon some contrivance for the purpose. He considered agriculture to be the foundation of all wealth, the great instrument of social improvement, and the conservator of public morals. Was not agriculture the foundation and the producer of wealth, while gold and silver were its mere exponents? He would not arrogate for agriculturists an extraordinary degree of morality, but this he would say, that there was nothing in their occupation that had the least tendency to deprave a man's morals. Then, what could be more delightful as a recreation for the philosophical mind? It was a subject in which we might learn from all nations; we might even learn a little from the Chinese (laughter). Gentlemen might laugh, but there were in the Chinese language 27,000 treatises on agriculture. China had for thousands of years subsisted on its agriculture, and had contrived, be-

sides, to accumulate immense wealth, and therefore was entitled to some respect as an agricultural country. America was now following the steps of her ancestors in improving her agriculture, and he hoped that a desire for improvement in that and everything else would be the only rivalry between them. Mr. Coleman concluded by proposing as a sentiment—"England, the sun of civilization; may she long continue, like her own Eddystone, a light in the ocean. May her light shine, not to burn, but cherish—not to render the world desolate, but happy. May her energies be concentrated on those high objects—the diffusion of knowledge, the extension of civilization, of liberty, and of peace."

The next toast was "The health of the local committee."

Mr. C. Colville, M.P., returned thanks. He said that the committee had devoted their best exertions to forwarding the objects of the society; but with respect to the implements, if they wanted to recommend themselves to Derbyshire farmers, they must be tried on Derbyshire land.

The Earl of Yarborough begged to propose the health of his noble friend the president of the society. He had known the noble earl from an early period, when he was no higher than his (Lord Yarborough's) hip, before his noble friend entered the navy. Now, his noble friend found himself on shore, and most efficiently performed the duties of a country gentleman. He believed he might congratulate his noble friend on having become a good agriculturist, inasmuch as he was able to tell to the penny what each experiment he made cost. He should not detain the company longer than by proposing the health of his noble friend, "The president of the society."

The Earl of Hardwicke returned thanks. He had gone through his duty on that evening without the slightest oppression until that moment, when it became his duty to return thanks for the proposal of his own health. He felt that he mainly owed the reception his name had met with, to the fact of his being president of the Royal Agricultural Society. He should not detain them any time; but he trusted he might be permitted to say that, in his opinion, agriculture could be best followed by adopting the practised rules of science; but there was in many places enough to do on land before science could be brought to bear upon it. He knew that by proper cultivation the produce of land might be doubled; he knew it by his own experience, because he had had himself which had doubled its produce in 15 years. This had been mainly effected by deepening the ditches and draining the land; in fact, the farmers of England had as yet but little idea of what might be done by those simple means. He begged to remind his hearers of the fact, that by

increasing their produce of wheat only 1 bushel an acre, they would add 24 millions of bushels to the food of the country. They should be careful in their selection of seed, and in their mode of making experiments. He hoped that he had not said anything that evening inimical to the interests of the labouring classes; he wished to augment their domestic happiness, and to raise their social position; and he hoped and trusted that the society would speedily turn its attention to their condition. The noble earl concluded by repeating his thanks to the meeting for the proof they had given of their approval of his presidency by receiving his health with such marked cordiality.

This being the last of the toasts, his lordship left the chair, and the meeting separated.

THURSDAY.—THE CATTLE SHOW.

This morning, as early as six o'clock, the yard was opened to the public; and in a very short space of time presented a scene of great animation. Indeed, this was the great point of attraction with all parties, until the hour approached for the banquet in the evening. At one o'clock, with a view to gratify the curiosity of all parties, the price of admission was reduced to 1s., when the influx of visitors was absolutely astounding. During the morning the railway trains were crowded to excess; and the whole town presented a scene such as was never before witnessed; in one word, it was a regular *Derby Day*.

A full description of the varieties of the animals in the yard would occupy more space than we can afford. Suffice it, therefore, to say, that the very best specimens of the very first qualities of animals were exhibited. The number of short-horns, of Herefords, and of Devons was unusually large, and presented to the practical eye a noble sample of what the British farmer can do in the production of live stock. Besides these, cattle of every breed, and of cross breeds, were entered for competition; although forming a distinct class of themselves, as to the distribution of prizes, and not being allowed to compete with the other three classes above specified. That part of the ground appropriated to the exhibition of horses, was a point of favourite resort to all who were admitted into the enclosure: It is impossible to do justice to the magnificent specimens of this noble and useful race of animals which were exhibited—stallions, cart stallions for agricultural purposes, cart mares, with their foals and two-year old fillies, were gathered together from all parts of the country, and exhibited a spectacle of animal excellence such as is rarely to be seen. Such exhibitions as these are

eminently calculated to develop the very best breeds of horses and cattle, although, indeed, it is almost impossible to perceive much room left for improvement, where such admirable perfection has been already attained. It will be no easy task for the judges, whose duty it is to decide between the respective merits of these noble animals, to award the coveted distinction of superiority, where all seem to be prime, and all deserving, if not of the first prize, at all events of some token denoting their superior excellence. This observation is applicable with still greater force and propriety of the difficulty of doing justice in determining the relative merits of the sheep exhibited, as there are so many points to which the attention of the judges must necessarily be given, such as wool, symmetry, character, &c., and, in the Southdowns, colour. About the relative value of these different points few agriculturists are agreed—some considering one to be of the first importance, and some another; so that, in fact, the award of the prize frequently depends on the taste as well as the judgment of the gentlemen selected to decide. We do not say this as finding fault with any decisions that have been made at this meeting, but merely as pointing out the difficulties which the judges have to contend with; and also to reconcile the unsuccessful competitors to those decisions, which we believe to have been most impartially given. Impressed with the importance of carrying the breed of sheep to the very highest state of perfection, the Royal Agricultural Society has offered munificent rewards to the successful competitors. A greater variety of first-rate sheep was never congregated together for exhibition by a British public. A space within the show-yard was appropriated to the pigs, the exhibition of which was equal, if not superior, to any previous one which the society has been able to produce.

GREAT PAVILION DINNER.

The last and greatest of the dinner festivities of the society came off to-night, at which the leading members of the association, together with their distinguished friends, met the great body of the farmers of the midland counties, and certainly nothing could exceed the *eclat* with which the dinner went off.

The chair was taken by the Earl of Hardwicke as president of the society; the vice-chair by the Earl Spencer.

The cloth having been removed, after the usual loyal toasts the Duke of Cleveland rose, and was received with great applause. He said that it had fallen to his lot to offer the next toast to their consideration, and he would venture to say there was not one person present

amongst those whom he had the honour to address, who would not join with him in cordially drinking success to the Royal Agricultural Association of England. He was aware that the fundamental objects of the institution were chiefly improvements in agriculture on scientific principles; in their implements; in different chemical processes; in the land by artificial manures, and so on. With a view to promote those objects he was anxious to enroll himself as a member of the society, and though he appeared there as a stranger, unknown to the greatest part of the company, he must say that what he had that day witnessed in the show-yard had given him the highest gratification, and that he never could have conceived, had he not actually witnessed it, that in so few years there could have been so great an improvement in the breeding of cattle and the mechanism of implements as had actually taken place. Nothing could do more credit to such a society than the line of conduct which it had adopted; and, as they all knew, in a country like this there was no limit to improvement. They had seen in other institutions the extent to which improvement had been carried; and it was impossible to say where agricultural improvement should be limited. Having made these few observations, and believing as he did that he should be followed by those who were much more able to enter into details, it remained only for him to thank them for the indulgence which they had shown, and the patience with which they had listened to him, and he would conclude with appealing to them, which he did most fervently, to join him in drinking, sincerely, heartily, and enthusiastically, to the success of "The Royal Agricultural Society of England."

Earl Spencer rose to acknowledge the toast, and was most rapturously received. He said he had been deputed by the council of that society to return thanks to the gentlemen present for drinking to its success. He was aware that the reason, or, at least, one of the reasons, which had induced the council to select him for this office was, that they knew that however much any gentleman present might wish for the success of this society; might wish to extend the benefits which he believed it was calculated to extend to agriculture throughout the country, and, indeed, throughout the civilized world; there was no one who wished it more strongly than the individual who had now the honour of addressing them, or who, in all his wishes, feelings, and desires, at least, was more intimately connected with the success of that society. It had not been established many years, but the time, he admitted, was past, in which they were entitled merely to state to them what the society looked to in its future expectations; they ought to be enabled to say

something as to the past. Certainly it was impossible that in the four or five years that had passed—that was, he believed, the fifth anniversary meeting—it was impossible that in so short a time any marked improvement could be effected by the society. But it had done a great deal. He asked them to consider what were the principles on which they had established the society? To improve agriculture; to look to the situation of the owners and of the occupiers of the soil; to look to the state and condition of the labourers. Upon every one of these points he could appeal to them with confidence whether the society had not done a great deal. With respect to the cultivation of the soil, it had extended the information which it had been enabled to collect throughout the country. It had united together large bodies of farmers, and enabled them to communicate their improvements one to the other, and it had also, as any man who had the means of meeting farmers in society would certainly testify, excited a spirit of enquiry and accurate research, which had not existed before. With respect to the success it had met with, he need only refer to the improvements which their show-yard that day exhibited; for though it was true they had very good shows previous to this, still there could be no doubt on the mind of any man who had witnessed the present exhibition, whether of cattle or of sheep, that this was far the best that had ever taken place. So long as the society excited this interest—so long as the interest which it excited among the agricultural community of this country was such as to lead them, at great expense, and at considerable inconvenience to themselves, to send their animals and agricultural implements to the society's show, so long undoubtedly the society might feel that it enjoyed their confidence, and that it was taking those steps which they considered would be beneficial to the agriculture of the country. Certainly, in the establishment of this society, when he saw the way in which it was adopted by the farmers of England, he did look with great interest to what they should be able to do for the agricultural labourers of the country. He had the honour of stating to them at their first meeting at Oxford, that it was very difficult for the society to know exactly how to proceed in this respect. He stated to them then (though it might appear trifling) the modes in which the society could do them good; but trifling as they appeared, that meeting thought them essential, and that mode the council had adopted. Agricultural labourers were a class of men slow in adopting suggestions, and were likely to be slow; but all the society could do was to lay clearly before them those matters which would be for their advantage. The society had published and circulated amongst

them, in a cheap form, directions and instructions by which they might be enabled to manage the small allotments, which he hoped and trusted were spreading throughout the country. With respect to those allotments, certainly the society could claim no merit in the establishment of the system, but he felt certain that, provided they were not too great, but of such a size as not to constitute the main dependence of the labourer, the allotment system, as an adjunct, must be most beneficial to him. There was another point, of which he was sorry to say the improvement which had been made, notwithstanding the efforts of the society, had been but trifling, it was important to consider—the great want of economy of the poor labourers of this country in the cookery and consumption of their food. If they knew how to manage it, and to divide it properly, the food of the labourers might be greatly improved, and their wages rendered much more efficient for their support. With that view the society had offered prizes for the best mode of cooking the food of the labourer, and had published and distributed a number of tracts amongst the labourers of England; but he found, up to the present time, not much advantage had been taken of those suggestions. He knew that class was likely to be slow to take such advantage; but he hoped and trusted and recommended to them, individually, to exert themselves in every possible way in this most interesting branch of their occupation. He had now stated to them briefly what the society had done. If it had yet much to accomplish, it had at least excited a great spirit of enquiry amongst the farmers; it had called forth great emulation amongst the makers of agricultural implements; and had, therefore, done that which could not fail to improve the practical cultivation of the soil—whilst, at the same time, it improved their means of cultivating it with effect. This was the statement which he had to make to them in behalf of the society, and he begged to return them his sincere thanks for the manner in which they had drunk to its success.

The president next gave the toast of “The foreign ministers,” which he begged to connect with the health of the illustrious gentleman who sat on his left hand, the minister for the United States of America.

Mr. Everett was several minutes ere he could obtain a hearing, such was the burst of enthusiasm with which he was received. He said—My lord and gentlemen, I assure you, without the slightest affectation, that whether I consider the kind manner in which you, my lord, have spoken of me personally, or of my country, I am almost overpowered with feelings which I am utterly destitute of words to express. You have only, my lord, done me simple justice in ascribing to me the

kindest feelings towards the land of my fathers. There is, my lord, a thought connected with this subject which has suggested itself to me since I listened to the speech delivered last evening by your lordship, illustrating the incalculable importance of every species of agricultural pursuits. The entire commerce carried on by Great Britain with the United States of America is fully twice as great as your commercial transactions with any other nation; and yet what, think you, does this commerce amount to? It is in value equal to the annual crop of oats and beans in Great Britain. They alone are equal to the exports and imports between Great Britain and the United States. I will adduce one more fact, to show the vast importance of your agriculture. The whole foreign commerce of Great Britain, for which you overshadow the ocean with your fleets, and plant your colonies in the most distant parts of the globe, is actually surpassed in value by the annual gross crop of your island. Truly, then, was it said, that he was the greatest benefactor to his country who caused two blades of grass to grow where only one grew before. I beg pardon of the company, and you, my lord, for the length of time I have detained you, and, in concluding, after thanking you for the indulgence you have manifested towards me, and the patience with which I have been listened to, would assure you all, that when these shouts shall be heard across the Atlantic—as they will be in 18 or 19 days hence—they will be echoed back from hearts as warm as yours.

Lord Morpeth was received with loud and general cheering. He said that the office had been assigned to him of proposing a toast upon that occasion. He had no knowledge whatever, and, to his great loss be it spoken, of the business of agriculture, either in theory, or, what is still more essential, in practice; and he had no other pretensions to be enrolled among its votaries—much less to stand thus forward among them—beyond what was contained in a full recognition of its importance, and a lively desire for its welfare. The noble lord concluded by calling upon the company to drink “Agriculture, manufactures and commerce.”

Lord Hatherton then rose, and said that the noble chairman had honoured him by permitting him to propose a toast, one which, in two words, embraced great and important objects. It was “Practice with science.” The object for which the society had been instituted was, to give the practical farmers frequent opportunities of meeting the men of science, from whom it was hoped that much benefit and valuable information would be derived, and that means would be given for drawing from the land those rich gifts with which it had pleased the Creator to

endow it. The magnificent show of implements they had seen that day bore ample testimony to the progress which had been made under the auspices of the society in those mechanical inventions so important to agriculture. It had been a delightful thing at that meeting to see the mechanics and the farmers exchanging suggestions and ideas, and to hear the former stating that most of the improvements now exhibited owed their origin to similar suggestions on previous occasions.

Professor Playfair said that, standing in the presence of scientific men so much more eminent than himself, it might appear presumptuous that he should rise and return thanks; but he hoped that his official connexion with the society would prove his excuse. The words which formed the noble lord's toast had become true from use; but a new value was given to them, a new era had arrived from the moment they graced the threshold of the society. Practice was but the application of certain principles, and it was the business of science to ascertain what those principles were. Science could never stand in antagonism with practice, because the former was founded on the experience of the latter, and was merely the intellectual expression of that experience. But surely it was not expected, when practice held out its right hand to science, that the latter could at once explain the mass of experience which the industry of ages had accumulated, and if as yet science had not been able to suggest any great change in practice, there was surely not much cause for complaint.

The chairman then called on the company to fill a bumper for the purpose of paying a just compliment to the mayor and corporation of Derby. In acknowledging in the warmest possible terms the kind reception which the society had met with from the town of Derby, he felt convinced he was speaking the sentiments of every member of the society. Derby was a most ancient borough, and that title would recommend it to the farmers of England, who warmly supported all our ancient institutions. The town of Derby was distinguished by its manufactures, its numerous philanthropic societies, and for the intelligence of its artisans, nor in ancient times was it without a great agricultural reputation. At least if they could draw any inference from a rhyme which no doubt they had learned in early youth, it must have been at one time celebrated for at least one description of stock:—

“As I was going to Derby all on a market day,
I saw the finest ram, sir, that ever was fed on hay.
This ram was fat behind, sir, this ram was fat before,
And between the horns of the ram, sir, you might turn a coach and four.”

(great laughter and cheering). With such rams the city of Derby must

have rejoiced in its agricultural produce (loud laughter). Now, however, the taste in that description of stock was changed, and animals affording food for the stomach and clothes for the back were preferred to such wonderful rams as the song described. The fitness of the change of taste was illustrated by the fact, that the population of the town had increased, even in the lifetime of the gentlemen whose healths he was about to propose, from eight thousand to nearly thirty, and surely such a vast increase of mouths to be fed must impress on the manufacturers of Derby the necessity of protecting agriculture. He would, without further preface, give them "The mayor and corporation of Derby."

The toast was received with much cheering.

The mayor, J. B. Crompton, Esq., rose to return thanks. He could assure the society, that although in their corporate capacity the corporation was unable to assist the society, many of the individual members of it were willing to do so, and had already given proof of their friendly disposition.

The Duke of Devonshire was received with the most enthusiastic cheering by the meeting. His grace said that the extreme satisfaction they had derived from that day's meeting would lead them naturally to revert to their noble president, whose health it was now his pleasure to propose. Every one who heard him must acknowledge the zeal and ability with which the noble earl had fulfilled the duties of his office. And now allow me to say a very few words in reference to the society itself. In my opinion, such a society was not only useful and calculated to produce the most beneficial results, but an honour to the country which originated it. It would advance the knowledge of science, and in dispelling ignorance and self-conceit, it had a tendency to unite all classes in harmony and good-will towards each other. It enabled the man with little wealth, who might have an ardent desire for improvement, to contend with those in more affluent circumstances, and thus conduced to the general advantage of all. From the principles it inculcated the labourer would learn to set a proper value on industry and sobriety, and would have opened before him a career of usefulness in the condition of life in which his lot had been cast. He knew of no means so certain to increase the prosperity of agricultural labourers, while, at the same time, it would conduce in an equal degree to the interests of those they serve. Such was his opinion of the usefulness of this society; and entertaining that opinion, he was anxious to pay a tribute to "Their worthy president, the Earl of Hardwicke."

The Earl of Hardwicke expressed his acknowledgments. The men

then assembled under that roof were examples of loyalty and good order, and the firm supporters of the throne and constitution. From such men an honour had a greater value. It was a great gratification to him to preside over a meeting like the present; in fact, he looked upon it as a feather in his cap. He was glad to be able to congratulate them on the fact that all doubts were removed as to the ultimate success of the society. The experience of four meetings, the increase of members, the improvements they had caused, and the publication of the articles, all proved their rapid progress. It had been said that there was not sufficient excitement at meetings such as those of the Agricultural Society. What! was there not sufficient excitement at meetings chosen without distinction of party, and whose object was an increase in the supply of food for mankind? Was not the national welfare involved in the success of such an undertaking? England was one great farm, on which its inhabitants depended for food. The society had already done much good, but the most important step was yet to be taken, namely, one towards improving the condition of the agricultural labourers. The society had not forgotten them, and it was their most earnest desire to hit on some plan for their benefit. But were they not assisting the labourer when they urged the farmer to a better cultivation of his land? for, depend upon it, the best cultivated farms would be found surrounded by the most contented labouring population. Before he sat down, he would allude to a matter which was of great importance. The society was most anxious that every facility should be given to the ingenious manufacturers who came to exhibit implements of agriculture, and the council would make some new arrangement for the trials of such implements. It was highly important that the most careful experiments should be made, and the most deliberate judgment given on these valuable adjuncts to agriculture. The noble earl again thanked the meeting for the warmth of feeling they had displayed in drinking his health, and sat down amidst loud and general cheering.

"The health of the Duke of Richmond, and prosperity to the Highland and Agricultural Society of Scotland" was then given.

The Duke of Richmond, in returning thanks, stood upon the table at which he had been sitting, nearly in the centre of the building, and in addressing the chairman, was compelled to turn his back upon those who sat behind him. He said he must first apologise to those upon whom he had turned his back. It was the first time he had ever done so upon the farmers of England. As the president of the Highland and Agricultural Society of Scotland, it became his duty to address them,

to thank them for the flattering manner in which they had responded to the toast of their noble chairman, and for their good wishes for the success of that society. Every member of that society would be grateful for the compliment paid them. The Highland Society was anxious to co-operate with them in everything that would tend to promote the welfare and prosperity of agriculture; in the success of which all classes of the kingdom were especially interested. It was his opinion that they all were deeply indebted to the local societies and farmers' clubs. That society never would have been formed if the practical farmers had not first formed the local societies, at which were collected such men as his noble friend, Lord Spencer, who were devoting their energies to the improvement of agriculture in all its numerous details, and by associating and co-operating with the farmers at these meetings, cemented the bond of union between the landowner and the occupier of the soil, which would be advantageous to both. He would venture to say that they ought all to feel deeply indebted to the founder of the noble society whose anniversary they had been that day celebrating. He sincerely congratulated them on the success of that day's exhibition, which was highly creditable to all parties concerned. He hoped to see and hear that many practical benefits would result from the great meeting held at Derby. Before he sat down he would propose a toast which he knew there was not a man in that meeting but would most cordially respond to it—"The labourers of England."

The president then proposed the next toast—"Success to the Royal Agricultural Improvement Society of Ireland." A deputation from that society had come to this meeting, and he must say it was most gratifying to receive a deputation from such a society.

The Marquis of Downshire said he stood before them one of the deputation from the Irish Agricultural Society. The supporters of that society wished to promote the general advantage, and by increasing the fertility of the soil, increase the affection of all classes for each other. He wished to state that since the formation of the Irish Agricultural Society, which does not date back more than three years, ninety districts had joined in the support of its general objects, and he hoped that no event might mar and impede the great national object it had in view.

The Marquis of Northampton said there was one omission of a serious nature in the toasts of the day—"The ladies." When his friend the representative of the United States reported the proceedings, he could not fail to let it be known in that country that the ladies of England responded to every generous sentiment that had for its object good-will amongst men and union amongst all nations.

The president said he had now come to the close of his duties, and he almost regretted that his presidency should cease after that toast. It had been with unbounded satisfaction he had filled the office, and he knew that the announcement of the name of his successor would be received with shouts of applause—"The name of the future President, Earl Spencer." From knowledge of his public and private character, it was with no ordinary pleasure he knew that his successor was the parent of the society. The noble earl was present, and his nature hated flattery; eulogy was painful to him, and it need not be given to secure the respect of the people of this country. He (the president) should remember Earl Spencer as a public man as long as he lived; and, opposed to him in politics, he must observe, that in the discharge of the painful and onerous duties of that parliament in which he might say the terrible crisis occurred, it was impossible to follow him in his arduous duties without being struck with his remarkable character. The evenness of his temper was never broken; the integrity of his heart and the love of his country was never doubted; his perseverance and determination no tide, no circumstances, no badgering could abate. He had laid down the distinguished office he held, and now followed the pleasures and pursuits of a private gentleman—his talents and virtues raising him more than his rank in the estimation of the people of this country. In the prospects before them it was a great gratification to know that he had consented to rule over them; it was gratifying to the people of England, and doubtless would be for the benefit of agriculture.

Earl Spencer was most enthusiastically received. His lordship said that it was most gratifying to him that a nobleman with whom he was personally upon the best of terms, but with whom he had differed in political life, should have spoken of him in the kind and flattering terms he had done, and he was equally gratified at the manner in which that meeting had received his name. His lordship again thanked them, and concluded amidst loud cheers.

The president then left the chair, and the meeting dispersed.

FRIDAY.

The sale in the show-yard, by Mr. Brearey, excited considerable interest. We subjoin a list of the principal sales:—

CLASS 1.

Lot 2.—Mr. Barnard's short-horned bull, bred by Earl Spencer, fetched £70. It was purchased by Sir R. Gunning. This bull won the first class prize.

1.—Mr. Ackers's short-horned Durham bull fetched £30.

- 4.—Mr. Bromley's short-horned Durham bull—£26.
 7.—Mr. Faulkner's ditto—£16.
 12.—Mr. Ratcliffe's short-horned bull—£28.
 15.—Mr. Timms's ditto—£19.
 18.—Mr. Cartwright's ditto—£29 8s.

CLASS 2.

- 20.—Mr. Barnett's ditto—£34.
 25.—Mr. Booth's ditto—£38.
 30.—Mr. Furniss's ditto—£35.
 37.—Mr. Strickland's ditto—£51.
 39.—Mr. Unsworth's ditto—£125. Purchased by W. S. Hayter, Esq., M.P.

CLASS 3.

- 46.—Mr. Burgess's improved Durham cow—£38.
 55.—Mr. S. Rollinson's short-horned cow—£23.
 65.—Mr. Cartwright's ditto—£31.
 88.—Mr. Goldsbro's short-horned yearling heifer—£42.
 89.—Earl Hardwicke's ditto—£19.

HEREFORDS.—CLASS 1.

- 101.—Mr. Carver's Hereford bull—£32.

DEVONS.—CLASS 1.

- 128.—Mr. Parson's Devon bull—£29.

CLASS 3.—COWS IN MILK.

- 154.—Mr. Pratt's pure long-horn—£24.

HORSES.

- 166.—Mr. Galton's cart stallion—£200.
 174.—Sir E. Kerrison's ditto—£78.
 176.—Earl Radnor's ditto—£75.
 180.—Lord St. John's ditto—£86.
 198.—Mr. Colvile's thorough-bred stallion—£30.
 201.—Duke of Richmond's ditto—£50.
 638.—Mr. Parker's cock-tail stallion—£140.
 640.—Mr. Parker's thorough-bred filly—£40.

RAMS.

- 252.—Mr. Umbers's Leicester shearling—£19.
 276.—Mr. Dester's Leicester ram—£13.
 295.—Mr. Smith's ditto—£13.
 237.—Ditto ditto—£18.

PIGS.

- 545.—Mr. T. Tunaley's sow and pigs—£20.
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ON IRRIGATION.

 BY CUTHBERT W. JOHNSON, ESQ., F.R.S.

The practice of irrigation, or the artificial watering of the soil, although well known to the cultivator of the earth from a very early period, yet may still be regarded as an agricultural operation yet in its infancy. It is a valuable system which, though very profitable to the cultivator, is not nearly so extensively and so scientifically employed by the farmers of our islands as its great importance demands; for, to say nothing of the slovenly way in which the operation is very generally performed in some districts, and the neglected state of the drains and water-courses in others, omitting, I say, to notice these, there are still more extensive tracts of land where no attempt even is made to employ the waters of the neighbourhood; although, as it very often happens, the adjoining land is well adapted for artificial flooding, and affords every facility for the next great desideratum in irrigation—may be rapidly and effectually drained, possesses a porous soil, with a non-retentive substratum. And if such naturally excellent situations are commonly neglected, to a still greater degree are all attempts omitted to raise the water on to the surface of the land by means of the pump. And yet there are few extensive districts in which we do not behold large fields of poor hungry soils, in the immediate neighbourhood of copious supplies of water, and that water surcharged with finely divided, organic earthy, and saline matters.

In considering this national neglect of irrigation, and how desirable it is that the system should be extended, I cannot but rejoice that the next great annual meeting of the farmers of the United Kingdom at the Royal Agricultural Society's Show will be at Southampton—a town not only remarkable by the general visitor for the beauty of its situation, but highly interesting to the cultivator for the excellence of the water-meadows which occupy the valleys of the Itchen and the Test, two bright swift-flowing streams which reach the sea in the neighbourhood of that place. In furtherance, then, of so excellent an object, and with the hope that the visitors of the Southampton meeting will not neglect to inspect the Hampshire water-meads, I will here repeat and enlarge upon what I have in another place long since had occasion to remark. (*Quar. Jour. Ag.*, v. 10, p. 558).

The very oldest records, written amid the thirsty soils, and under the burning sun of Palestine, on many occasions bear ample testimony to the early employment of water for the purposes of irrigation. Many beautiful similies dispersed over the Bible, indicate how closely the first orientalists had watched the influence of water upon vegetation. "For there is hope of a tree if it be cut down that it will sprout again," exclaims Job (c. 14, v. 7), "yet through the scent of water it will bud and bring forth boughs like a plant." The simile employed by Isaiah to represent barrenness and desolation is "a garden that hath no water." And we are pretty well assured that even in the days of the patriarchs they laboured incessantly to supply their lands with water, by means of a variety of hydraulic machines, varying in perfection from a bucket swung with ropes between two men, to water-wheels, worked something after the manner of the modern tread-wheel, by the feet of men. Moses, when he alluded (*Deut.*, xi, 10, 2 *Kings*, xix, 24) to the Israelites sowing the corn in Egypt and watering it with their feet, alluded to this practice. And in the East, where everything remains so unchanged the practice, according to Niebuhr (vol 1, p. 121), is still continued. It is certainly still followed under still ruder forms by the miserable ryotts of Hindostan. My brother, Mr. George W. Johnson, when speaking of the indolent irrigation system of India, observes, "In places favoured by nature whole plains are occasionally irrigated, merely by the construction of a dam across the outlet of some mountain stream, or it is confined in the same way nearer to its source, so as to form a distant reservoir, from which, at the most desirable seasons, the water may be obtained. In less favourable situations the water frequently has to be raised to a considerable height, in order to obtain an elevation level with, or slightly above the cultivated land. This is very generally effected by a scoop, made of matting, suspended between two ropes, the ends of which are held by two men, who bale it from the reservoir into a hole some feet above it, and from thence it is similarly baled by others, from hole to hole, until the desired height is attained.

In other places the scoop is suspended between poles erected in the form of a gibbet; at others by a long trough, swinging across a centre, and dipping into the water at one end, which, when raised, makes it run out at the other, in a way well known to those marine salt makers who employ sun pans or shallow ponds to evaporate the sea water.

In China still more pains are taken in the general use of water for agricultural purposes, but the machinery thus used in the Celestial Empire is nowhere to be found in Hindostan. "The machinery so general

in China," says Dr. Tennant (*Indian Rech.*, v. 2, p. 15), "is nowhere used in India for raising water. The lands about Mongheer and Patna, which are too high above the level of the Burrampooter to be flooded with facility, yet lying at the foot of the hills, are yet capable of being thus benefited by their streams. Industry and skill are here more remarkably exhibited in the conduct of irrigation than where the soil is naturally more easily subjected to the flooding."

The practice of the natives is still similar to that described in 1797 by Dr. Tennant. After ploughing the fields in the usual manner, but before sowing, they divide them into regular small squares, like a chess board. Each square is surrounded with a shelving border, about four inches high, capable of preventing the escape of water. Between these square enclosures small dykes are formed, for conveying the rivulet over the whole field. When the water has stood a sufficient time in one square, it is let off into the surrounding dyke, and conveyed to another square, and so in succession through the whole field. The fertility induced, amply recompenses the labour, and the neatness imparted to the country by this husbandry is very striking.

In other parts of India the water has to be raised from deep wells, several of which are dug in the most elevated parts of each field. The labour of drawing the water is performed by two bullocks, not travelling round in a mill, but pacing in a direct line from the well, and raising from it a leather bag, by means of a rope which passes over a pulley suspended above the well's mouth. The various little channels already mentioned radiate from these wells. About Patna the irrigation water is raised from the wells by means of a bamboo lever, with its fulcrum on a frame about ten feet high; a weight at the opposite end being employed to assist the workman in counterpoising the leathern bag of water. This plan is only resorted to when the wells are shallow, and the water near the surface of the earth, and then buckets of leather or iron are used. In this way four bullocks and three labourers are engaged nine days in thoroughly irrigating an acre of land (*Indian Rech.*, v. 2, p. 276). On the Coromandel coast, where the soil is thin and sandy and the water scarce, irrigation is accomplished by much greater exertion, and yet the crops are very light.

The importance of this branch of Indian agriculture is evidenced by the great number of wells which even these, the most indolent of people, sink in districts deficient in streams. "You cannot ride out in the neighbourhood of Cawnpore," adds Dr. Tennant, "without meeting with them in such numbers that accidents are not unfrequent of horses tumbling into them with their riders."

Near Madras, at Saymbrumbacum, a reservoir more than seven miles long, and three broad, has been formed for the purposes of irrigation by merely raising a bank across a natural ravine. In the Tamul language this is called an *eray*. This supplies thirty-two villages, containing 5000 persons employed in agriculture (should the rains fail) for 18 months. Sluices lined with bricks pass under the bank to supply the fields. The inner opening of the sluice is covered by a flat stone, in which is cut a circular hole, through which the water is allowed to pass as required, by means of a plug fixed to a bamboo, and secured from escape by means of stone pillars and cross-bars.

Sir J. Malcolm remarks that the Persian wheel is very common in Maliva. This is set in motion by means of a horizontal wheel, with cogs fitting into others on the vertical wheel. The horizontal wheel is moved round by bullocks.

The leathern bag employed in India to draw water from deep wells holds about 45 gallons, and is raised by two bullocks and a lad every minute and a half, from a well 44 feet deep, and the bullocks will work eight hours a day. The mound at the edge of the well is raised to a height proportionate to the elevation of the ground to be watered.

There are two ropes to the bag; one fastened to a stick across its mouth, for drawing it up, and the other, fastened to the point in which the other end of the bag terminates, helps to raise it and pour out the water. The ropes are drawn over pulleys by the bullocks descending the slope, and the draught continuing upon the rope attached to the bottom of the bag, after the top has been stopped by the pulley, the water is emptied into the channel, prepared so as to begin on a level with the top of the mound. The bullocks are taught to walk back as soon as the emptying is completed till the bag is again immersed in the water, and partially sunk by a stone fastened on one side of its mouth (*Malcolm's Report on Maliva*, 425). A similar plan is followed in the vicinity of Hyderabad. (*Trans. Agri. and Hort. Soc.*, vol 5, p. 44).

Irrigation is said by Sir Henry Fane to be more extensively pursued by the agency of the waters of the Indus than he had seen anywhere else in India. It is conveyed by canals far into the interior, and raised from them on to the fields by means of Persian wheels. This is rendered necessary by the deficient supplies of rain, which may be estimated from the fact stated in the same communication, that up to September, 1839, there had not been any rain for three years. (*Ibid*, Oct., 1839, p. 3).

Irrigation is also very extensively and scientifically carried on in the Nepaul valley. (*Ibid*, v. 4, p. 111).

Many of the waters employed in India for the purposes of irrigation appear to be derived from rivers which, at certain seasons of the year, are evidently surcharged with organic and other mechanically suspended matters. Thus, the Rev. J. M. Everest found in the waters of the Ganges, at Ghazepoore, in the province of Benares, the following variations in the insoluble matters of the waters of the Ganges (*Gleanings in Science*)—

		Grains.
July 3.	In a wine quart	1
„ 7.	ditto	8
„ 23.	ditto	10
Aug. 8.	ditto	58·10
„ 13.	ditto	37
„ 22.	ditto	26
Sep. 6.	ditto	17
„ 24.	ditto	8
Oct. 8.	ditto	6

This insoluble portion of the water of the Ganges has been examined by Mr. Piddington, who found in 200 parts the following substances :—

	Soil from Banaberrin.	Soil from Mountpre.
Water	2	2
Vegetable matters	4½	5½
Saline matters, chiefly muriate of potash..	0½	0½
Carbonate of lime (chalk)	12½	16½
Phosphate of lime	0	1
Oxide of iron	12	12
Silex	156	139
Alumina	6½	14½
Loss	6½	8½
	200	200

From an examination of this analysis, we should be quite prepared for the report of Mr. Piddington, that, while the lands within the reach of these flood-waters preserve their original fertility, the higher soils are generally and rapidly impoverishing. (*Trans. Agri. and Hort. Soc.*, v. ii, p. 40-1).

Such are the efforts made by the cultivators of the banks of the Indus and the Ganges to irrigate their thirsty soils; and if we come still near home, we find the tenants of the valley of the Nile employed with equal industry for a similar purpose. According to Dr. Shaw, the following is the modern mode of raising and using the water of the Nile, for the purpose of irrigating the soils of Egypt. Such vegetable productions as require more moisture than what is occasioned by the annual inun-

dation of the Nile are refreshed by water that is drawn at certain times out of the river, and lodged in large cisterns made for that purpose. The screw of Archimedes seems to have been the instrument formerly made use of for that purpose ; though at present the inhabitants either supply themselves with various kinds of leather buckets, or else with a *sakiah*, as they call the Persian wheel, which is the most useful and generally employed machine. Engines and contrivances of both these kinds are placed along the banks of the Nile, from the sea to the cataracts ; their situation being higher, and, consequently, the difficulty of raising the water being greater as we advance up the river. When their pulse, saffron, melons, sugar-canes, &c., (all of which are commonly planted in rills) require to be refreshed, they take out a plug from the bottom of the cistern, and then the water gushing out is conducted from one rill to another by the gardener, who is always ready, as occasion requires, to stop and divert the current. A machine similar to the Persian wheel is still employed in China by the cultivators, for the purposes of irrigation. And this use of machinery for the purposes of watering might, in fact, in many situations be advantageously employed in England, to a much greater extent than is commonly believed. It is well known how many thousand acres of valuable land are profitably *drained* by means of the steam-engine. The tracts of land to which I allude are those on a slope, as on the side of a hill, and the quantity of water required for the irrigation of these lands is not so large as to be beyond the power of the steam-engine. To sufficiently saturate with water a square yard of a soil composed of a calcareous sand, to the depth of one foot, as in irrigation, requires about 30 gallons of water, equal to about 145,000 gallons per imperial acre. That the steam-engine could readily and profitably supply this quantity of water, may be concluded from several facts ; for instance, the two steam-engines, the one of 80, the other of 60 horses' power, which kept Deeping Fen, near Spalding, (containing about 25,000 acres) completely drained when working in 1835, only 96 days of 12 hours each, raised more than 14,000,000 *tons* of water several feet. And it has been proved, that by a common condensing steam-engine, one bushel of coals will raise more than 50,000,000 lbs. of water one foot. In many situations, therefore, where for the purposes of irrigation good river water can be copiously obtained, and fuel is at a moderate price, I am confident that great results are yet to be obtained by the aid of mechanical power ; for by the steam-engine the soils of all others the best adapted for irrigation may be successfully brought into cultivation ; for instance, the poor sands and gravels on the sloping

banks of many of the English and Scottish rivers, many of whose waters, from being charged with organic matter, the carbonate and sulphate of lime, and various earthy substances, are excellent for the use of water meadows. The early employment of irrigation by the Egyptians and Chinese was most likely the result of the good effects which were observed to be produced by the overflowings of the Nile and the Chinese rivers; for, in the "Celestial Empire," irrigation has, it seems, been employed, according to their veracious historians, for a period long before that assigned to the flood. In Italy, especially on the banks of the Po, the cultivators of the earth have certainly employed this process for a period previous to the days of Virgil (*Georg.*, lib. 1, v. 106-109),—

"Deinde satis fluvium inducit, rivosque sequentes"—

and it is still carried on with a zeal and care worthy of the art they practise. M. P. Cato, the earliest of the Roman writers on agriculture (150 years before Christ), in his ninth chapter told the Italian farmers to "make water meadows if you have water, and if you have no water, have dry meadows." The directions of Columella seem to have all the freshness of a modern age about them. He was the first who noticed the inferior nutrition afforded by the hay from water meadows. "Land," says he, "that is naturally rich, and in good heart, does not need to have water set over it; and it is better hay which nature of its own accord produces in a juicy soil, than what water draws from a soil that is overflowed. This, however, is a necessary practice when the poverty of the soil requires it; and a meadow may be formed either upon a stiff or free soil, though poor when water may be set over it. Neither a low field with hollows, nor a field broken with steep rising ground are proper; the first, because it contains too long the water collected in the hollows; the last, because it makes the water run too quickly over it. A field, however, that has a moderate descent may be made a meadow, whether it be rich, or so situated as to be watered; but the best situation is where the surface is smooth, and the descent so gentle as to prevent either showers or the rivers that overflow it remaining too long, and, on the other hand, to allow the water that comes over it quietly to glide off; therefore, if in any part of the field intended for a meadow a pool of water should stand, it must be let off by drains; for the loss is equal, either from too much water or too little grass." (*Col.*, lib. 2, c. 16.) Pliny tells us that "meadows ought to be watered immediately after the spring equinox, and the waters restrained whenever the grass shoots up into stalk." (*Nat. Hist.*, lib. 18, c. 27.) When, after the fall of

the Roman Empire, agriculture, in common with all other sciences, rapidly declined, a very remarkable exception to this melancholy result of slavery and despotism was presented in the case of irrigation, which was carried on and extended through the long period of the dark ages with equal zeal and success. This was more especially the case in Lombardy, where it was certainly prosecuted on a very bold and profitable scale long before 1037.

The princes of Lombardy patronised and followed the example of the various religious establishments, which then monopolized all the wealth and learning of the land, in extending the employment of water in all possible directions. The monks of Ghiazevelle, in particular, were so celebrated for their knowledge of this branch of agriculture, and of hydraulics in general, that the emperor, Frederick the First, very gladly sought their advice and assistance. This system has ever since been carefully extended and improved by every possible means. The waters of the chief rivers, such as the Po, the Adige, the Tagliamento, and of all the minor streams, are employed in irrigation. There is no other country which possesses an extent of rich water meadows equal to that of the Lombards. The entire country, from Venice to Turin, may be said to be formed into one great water meadow. Yet the irrigating system is not confined to grass lands; the water is conveyed into the hollows between the ridges in corn lands; into the low lands, where rice is cultivated, and around the roots of vines. From Italy the practice extended into the south of France, into Spain, and then into Britain. It was only, however, towards the termination of the seventeenth century that water meadows were constructed in Britain upon anything like a regular system. Of these, those in Wiltshire, which are amongst the most celebrated in England, especially those in the Wyley Bourn, were made between 1700 and 1705. Those of Hampshire and Berkshire were constructed about the same period; but they were at first constructed in a manner very inferior to the modern noble water meadow lands of those counties.

It is worthy of remark, that the waters employed for these celebrated southern meads are from the most clear and swift-flowing of all the English rivers; issuing from the chalk formation they are equally copious and transparent. Bright, however, as they are, we shall presently see that even those of the Itchen contain impurities; and it is equally certain that these impurities are absorbed by, and become the food of the grasses. That the portion of saline matters contained in spring water is diminished by being used for the purposes of irrigation, has been

proved by the experiments of Dr. H. R. Madden, who found that a gallon of water, "clear as crystal," issuing from the base of the Pentland Hills, contained before passing over a meadow ten grains of common salt, and four grains of carbonate of lime (chalk), but after passing over the meadow, a gallon of the same water contained only five grains of common salt and two of carbonate of lime. (*Trans. High. Soc.*, v. 8, p. 687).

Some of the chief advantages, therefore, of irrigation may evidently be derived from almost any description of water; for it is proved by the good effects produced by the most brilliant chalk or limestone waters, and the still greater fertilizing effect of those surcharged with organic matters, as in the Craigintinny meadows, near Edinburgh, that there is no water too bright, or too full of impurities, to be useless for the purposes of irrigation.

This fact, then, being pretty well established, I next propose to examine the chemical properties of river water, and the effects produced by it in irrigation; concluding with a few observations upon the practice of the best and most skilful managers of the water meadow of the south of England.

River water naturally varies in the nature of its impurities with the country through which it flows, and the inhabited places near which it passes. In 10,000 parts of the water of the Thames, after most of the mechanically suspended matters had subsided, Dr. Bostock found about $1\frac{1}{2}$ parts of foreign substances, viz.—

	<i>Parts.</i>
Organic matters	0·07
Carbonate of lime (chalk)	1·53
Sulphate of lime (gypsum).....	0·15
Muriate of soda (common salt).....	0·02

In the same proportion of the water of the Clyde, Dr. Thomson detected $1\frac{1}{2}$ parts of impurities, namely—

	<i>Parts.</i>
Common salt.....	0·369
Muriate of magnesia	0·305
Sulphate of soda	0·114
Carbonate of lime.....	0·394
Silica	0·118

In 10,000 parts of the water of the Itchen, I found about $2\frac{1}{2}$ parts of solid matter, viz.—

	<i>Parts.</i>
Organic matter.....	0·02
Carbonate of lime.....	1·89
Sulphate of lime	0·72
Muriate of soda.....	0·01

From an examination of the substances found in these streams (and they afford a pretty correct view of the contents of most others), the farmer will see that they yield ingredients which are the food, or natural constituents of the grasses. Thus, the sulphate and carbonate of lime are found in most of them, and there is no river water which does not contain, in some form or other, organic matter.

To ascertain, therefore, whether pure water was alone able to effect all the magical effects of irrigation, it was necessary to employ other water than of rivers, lakes, or even springs. Pure water, as obtained by gentle distillation, therefore, has been employed as a supporter of vegetation; but it was found totally inadequate to the support of plants. They merely vegetated for a time, but they could not, by any means, when thus supported, be made to perfect their seeds. Pure water, therefore, notwithstanding the dreams of the Greek philosophers, and the celebrated deceptive experiment of Van Helmont, with his willow tree, is not able to support the growth of the grasses. And yet it has been shown that very impure water, such as that issuing from a sewer or a dunghill, is alone sufficient to sustain vegetation. This was clearly evidenced in the experiments of M. Lampadius; for he found that plants placed in a pure earth, such as silica or alumina, although they would not grow when watered with pure water only, yet that when they were watered with the liquid drainage of a dunghill, they flourished very luxuriantly. And this fact has also been proved in another way: it has been shown that the quantity of solid or earthy matters absorbed by plants is in exact proportion to the impurity of the water with which they are nourished.

All these facts would appear to confirm the conclusions of some of the ablest cultivators, that the chief advantages of irrigation are attributable to the foreign substances with which the water is charged; although, as I have elsewhere observed, almost every farmer has a mode of accounting for the highly fertilizing effects of irrigation—one thinks it *cools* the land, another that it keeps the grass *warm* in winter. And this was Davy's opinion. He thought that a winter-flooding protected the grass from the injurious effects of frost. He says "Water is of greater specific gravity at 42° than at 32°—the freezing point; and hence, in a meadow irrigated in winter, the water immediately in contact with the grass is rarely below 40°, a degree of temperature not at all prejudicial to the living organs of plants. In 1804, in the month of March, I examined the temperature in a water meadow near Hungerford, in Berkshire, by a very delicate thermometer. The temperature

of the air at seven in the morning was 43° . In general, those waters which breed the best fish are the best fitted for watering meadows; but most of the benefits of irrigation may be derived from any kind of water."—(*Ag. Chem.*, 352.)

In these conclusions with regard to the theory of irrigation, I have found many excellent practical farmers concur. Thus, Mr. Simmons, of St. Croix, near Winchester, considers that the great benefit of winter flooding for meadows is derived, in the first place, from the deposits made by the muddy waters on the grass; and, secondly, from the winter covering with water preventing the ill effects to the grass of sudden transitions in the temperature of the atmosphere. This gentleman is perfectly aware of the value of the addition of the city drainage of Winchester to the fertilizing qualities of the Itchen river water, and of its superiority for irrigation after it has flowed past the city, having water meadows both above and below the town; and he finds that if the water has been once used for irrigation, that then its fertilizing properties are so materially reduced, that it is of little value for again passing over the meadows; and so convinced is he of this fact by long experience, that, having in this way long enjoyed the exclusive and valuable use of a branch of the waters of the Itchen for some grass land, a neighbour higher up the stream followed his example, constructing some water meadows, and using the water before it arrived at those of my informant, who, in consequence, found the water so deteriorated in quality (though not sensibly diminished in quantity) that he once thought of disputing the right with his more upland neighbour. The experience of other irrigators tends to the same conclusion. In the best managed water meadows of Hampshire the farmer does not procure annually more than three crops of grass; yet in situations where a richer water is employed, as near Edinburgh, four or five are readily obtained.

It is easy to see why it is that the impurities of river water are so nourishing to the meadow grasses. For instance, if the water contains sulphate of lime (gypsum), which it certainly does if the water is *hard*, it must, under ordinary circumstances, on this account alone be highly fertilizing to the land it irrigates; since many of the best grasses contain this salt in very sensible proportions. Calculating that one part of sulphate of lime is contained in every two thousand parts of river water, and that every square yard of dry meadow soil absorbs only eight gallons of water (and this is a very moderate allowance, for many soils will absorb three or four times that quantity), then it will be found that by every flooding more than one hundred weight and a half of gypsum per acre is diffused

through the soil by the water; a quantity equal to that generally employed by those who spread gypsum over their clover, lucern, and sainfoin, as a manure, either in the state of powder or as it exists in ashes. And if we apply the same calculation to the organic substances ever more or less contained in flood waters, and allow only twenty parts of animal and vegetable remains to be present in a thousand parts of river water, then we shall find, taking the same data, that every soaking with such water will add to the meadow nearly two tons per acre of animal and vegetable matters; which, allowing in the case of water meadows five floodings per annum, is equal to a yearly application of ten tons of organic matter.

The quantity of foreign substances present in river water, although commonly less, yet very often exceeds what I have thus calculated to exist in it. I have found it, however, difficult to give from analysis the amount which, under ordinary circumstances, is present in river waters with even tolerable accuracy; since the proportion not only varies at different seasons of the year, but a considerable proportion of the merely mechanically suspended matters subside when the specimen water is suffered to rest.

The *quality*, therefore, of the water employed for the purposes of irrigation is of the first importance to be well understood by the farmer; and although many more modern discussions have taken place on the subject, yet the definition which the great Lord Bacon gave of the advantages of meadow watering has never been excelled—"That it acts not only by supplying useful moisture to the grass, but likewise by carrying nourishment dissolved in the water." The extent of the aqueous particles of water emitted by growing plants is little understood. "The agency of water in the process of vegetation," says Mr. Stephens, "has not till of late been distinctly perceived. Dr. Hales has shown that in the summer months a sunflower, weighing three pounds avoirdupois, and regularly watered every day, passed through it, or perspired twenty-two ounces each day, that is, half its weight. Dr. Woodward found that in the space of seventy-seven days a plant of common spearmint increased seventeen grains in weight, and yet had no other food than pure rain water; but then he found that it increased more in weight when it lived in spring water, and still more when its food was Thames water." (*Practical Irrigator*, p. 2.) And when speaking of the fact, that some irrigators think clear spring water equal to any, he adds (p. 24), "I would recommend to those who are of the same opinion, to inspect the irrigated meadows which are watered by

the washings of the city of Edinburgh, where I trust they will find the superiority of muddy water, to that of clear spring water, most strikingly manifested."

It by no means follows as a necessary result of any contemplated improvement in irrigation that the water should previously undergo a chemical examination. There are many other modes by which the farmer can form a pretty correct conclusion as to the fertilizing properties of the water he proposes to employ.

The surest proofs, says Mr. Exter, of the good quality of water (and the observations of this gentleman will be readily confirmed by the irrigators of the southern counties) as a manure, are the verdure of the margins of its streams, and the growth of strong creases in the stream itself; and wherever these appearances are found, though the water be perfectly transparent, the occupier of the soil through which it flows may depend in general on having a treasure, if he is attentive to it; but that this is not invariably the case, and that there are instances where a good water will not improve the herbage of certain soils, is proved by the following account (and there are several other cases with which I am acquainted) of the meadows of Mr. Orchard, of Stoke Abbey, Devon. These two meadows are situated on the side of a hill, their aspect nearly south; the superstratum a fine rich loam, from eight to ten inches deep, on a substratum of strong yellow clay. No difference whatever can be seen by the naked eye, in either the upper mould or the substratum, or in the herbage growing on the surface of them, except that in the lower part of one a few rushes appear, in consequence of some small springs which rise near them, but the water from them is not sufficient to render any part of the land poachy. At the head of the two meadows is a large pond, formed by the collecting of some small runs of spring water rising near it, and which is also improved by the wash of a small farm-yard adjoining, which, of course, must add to its efficacy as a manure. When this water is thrown over one of the meadows, it produces the richest herbage in abundance, and this field is regularly mowed for hay; on the other meadow, though repeatedly tried, it produces no good whatever.—(*Ann. of Agr.*, vol. 30, p. 206.)

This result is attributable to the superior tenacious retentive quality of the substratum of the lower field, or of some chemical difference in the composition of the soil; and although almost any description of soil is adapted to the formation of water meadows, those of a heavy clay description are generally the most unsuitable; those of a light or peaty kind are better; and those with a sandy or very absorbent gravel sub-

stratum still more so. There are some of the most celebrated water meadows on the banks of the Kennet of this description, and many of the best on the banks of the Wiltshire Avon have a mass of broken, porous flints for a subsoil. Those near Edinburgh, irrigated by the city drainage, rest upon the sands thrown up by the sea. It is evident, therefore, that it is as important an object in the construction of these meadows to secure a ready and rapid exit for the flood-waters, as to procure, in the first instance, a copious and fertilizing supply.

The farmer is generally well aware of the injurious effects to his meadows of suffering the water to remain too long on them. He watches, therefore, with much care for the first indications of fermentation having commenced, which is evinced by the rising of a mass of scum to the surface of the water: putrefaction is now beginning in the turf, and he knows very well that if the water is not speedily removed, that his grass will be either materially injured or entirely destroyed; he hastens, therefore, to open his water-courses. There are some soils however in the neighbourhood of Standen in Berkshire, of so porous a quality, that they need not any drains to empty the water-courses; after a few hours all the water is absorbed by the soil; and yet these lands, with hardly six inches of mould above the gravel, are amongst the richest of water-meadows: the earliest and sweetest grasses are copiously produced on them.

Almost any description of grass, it is found, will flourish under proper management in water-meadows. Those whose soils consist of peat, resting on sand or on sandy loam, with a substratum of chalk or gravel, generally produce the meadow foxtail, the brome grass, and the meadow fescue, on the tops and sides of the ridges. The furrows and sides of the drains are usually tenanted by the creeping bent, the hard fescue, the rough-stalked meadow grass, and the woolly soft grass. In those water-meadows whose soil consists of a sandy loam on a clay subsoil, the chief grasses are commonly the creeping-rooted soft grass, the crested dog's tail, the meadow barley, and the sweet-scented vernal grass. But some grasses change their appearance in a very remarkable degree when exposed under favourable circumstances to the influence of the flood-waters. This fact is strikingly exemplified in the case of two small meadows situated at Orcheston, six miles from Amesbury, in Wiltshire, denominated from their great produce "the long grass meads." These says Davis—"Contain together only two acres and a half, and the crop they produce is so immense, that the tithe of their hay was once sold for five guineas." Much discussion took place amongst the Wiltshire

farmers as to the nature of the crop of these meads, before it was at last shown that the greatest part of their herbage consisted of nothing else than the black couch or couchy bent, the *agrostis stolonifera*, one of the worst of the grasses or weeds which haunt the poor ill-cultivated arable soils.

It is a correct conclusion of the farmer, that the grass and hay of water-meadows is not so nutritious as that of permanent pasture lands. The difference, however, is not so great as is commonly supposed. The late George Sinclair determined this experimentally, and he is no mean authority with regard to all that relates to the grasses. He obtained from the rye-grass (*Lolium perenne*), at the time of flowering, taken from a water-meadow that had been fed off with sheep till the end of April, of nutritive matter, 72 grains; and from the same weight of this grass, taken from a rich old pasture, which had been shut up for hay about the same time, 92 grains. From the same grass from the meadow, that had not been depastured in the spring, 100 grains. And from the same grass, from the pasture which had not been fed off, 120 grains. All the grasses, in fact, where their growth is forced by the application of either liquid or solid manures, are found to contain nutritive matter in diminished quantities:—this, too, was determined by Sinclair. From four ounces of a very rankly luxuriant patch of rye-grass, on which a large portion of cow-dung had been deposited, he obtained of nutritive matter, 72 grains. From the same quantity of the same grass, growing on the soil which surrounded this luxuriant patch, he obtained 122 grains. And, in a second trial, the same species of grass, on a soil entirely destitute of manure, afforded, of nutritive matter, 95 grains. On the same soil, excessively manured, the grass afforded only 50 grains. In these experiments, the plants were of the same age, and were examined at the same stage of their growth. (*Hortus Gram.* 384).

With regard to the construction and management of water-meadows, there are many practical works of the highest authority to which the farmer has ready access, and in the following observations therefore, I shall merely very briefly paraphrase the accounts given by Mr. Davis and others, of the practice of irrigation in the southern counties—(*Stephens's Practical Irrigator*—*Brown's Rural Affairs*, p. 263—*Sinclair's Hort. Gram.* p. 382—*Davis's Wiltshire*—*Driver's Hampshire*.) In this, however, ever since the time when Davis wrote, there has been a great and steady improvement. The land is better levelled, the slopes more evenly preserved, the water ways, aqueducts and hatches better constructed, and in many of the more recent improvements in the valley of

the Itchen in Hampshire the sliding water-doors are regulated by a cogged wheel turned by a moveable winch, so as to render them safe from alteration during the absence of the meadow-keeper.

The management of the Wiltshire and Hampshire water-meadows, as well as it can be briefly described, is as follows:—In the autumn, the after-grass is eaten off quite bare, when the manager of the mead (provincially the *drowner*) begins to clean out the main drain and to “right up the works;” that is, to make good all the carriages and drains which the cattle have trodden in, so as to have one tier or pitch of work ready for drowning. This is immediately put under water while the drowner is preparing the next pitch.

In the flowing meadows this ought to be done if possible early enough in the autumn to have the whole meadow ready to catch the first floods after Michaelmas. The water then being the first washing of the arable lands on the sides of the chalk hills, as well as the dirt from the roads, is then thick and good; and this remark as to the superior riches of the flood-waters is one that is commonly made in Berkshire and other parts of England. The length of the autumnal watering cannot be precisely stated, as much depends upon situation and circumstances, but if water can be commanded in abundance, the custom is to give meadows “a thorough good soaking at first,” perhaps for a fortnight or three weeks, with an intermission of two or three days during that period, and continue for the space of two fortnights, allowing an interval of a week between them. The works are then made as dry as possible, to encourage the growth of the grass. This first soaking is to make the land sink and pitch close together, a circumstance of great consequence, not only to the quantity, but to the quality of the grass, and particularly to encourage the shooting of new roots, which the grass is continually forming to support the forced growth above.

While the grass grows freely, a fresh watering is not wanted; but as soon as it flags, the water must be repeated for a few days at a time, always keeping this fundamental rule in view—“to make the meadows as dry as possible after every watering, and to take off the water the moment any scum appears upon the land, which shows that it has already had water enough.”

Some meadows that will require the water for three weeks in October, and the two following months, will not, perhaps, bear it a week in February or March, and sometimes scarcely two days in April and May.

In the catch-meadows, which are watered by springs, the great object is, to keep the works of them very dry between the intervals of water-

ing; and as such situations are seldom affected by floods, and generally have too little water, it is necessary to make the most of the water, by catching and rousing it as often as possible; and as the upper works of every pitch will be liable to get more water than those lower down, a longer time should be given to the latter, so as to make them as equal as possible. (*Davis's Agriculture of Wiltshire*, p. 125—7).

In Berkshire they first flood their water-meadows about Michaelmas; these are situated principally on the banks of the Kennet. The first flooding they deem the richest in quality: this they keep on the land for about four days, then they dry it for about a fortnight, and then the water is let on for three or four days more; those meadows which are the most readily dried are the most productive. There are none more so, in fact, than those which have a porous, gravelly, or broken flint bottom, from which the flood-water readily escapes, almost without drains. They begin to feed their meadows with sheep about the 6th of April, and continue feeding till about the 21st of May, when the meadows are again flooded for a crop of hay; the land is then flooded and dried alternately for three days until hay-time.

The land in Wiltshire under this kind of management has been computed, and with a tolerable degree of accuracy, to be between 15,000 and 20,000 *acres*. Some considerable additions, however, have been made to the water-meadows of the district since this calculation was made. (*Davis's Wilts.*, p. 122). About the same number of acres are formed into water-meadows in Berkshire, and a still larger number in Hampshire. No one has attended more carefully to his water-meadows than Lord Western, on some of those situated on the London clay formation in the Blackwater Valley in Essex, a soil of all others, perhaps, from its tenacity, the least adapted to their successful formation, and his testimony is very important:—"There is an old adage," says his lordship, "that water is the best servant in agriculture, and the worst master. Water has in itself intrinsic value,—distilled through chalks, lime, or marl, it acquires a portion of their qualities, though preserving the most perfect transparency, and, coming down in torrents and floods, it carries along the finer particles of earth and manure from the mountains or higher grounds into the valleys; hence, of course, it is, that the valleys derive their fertility, and the value of the meadow has been originally created by an accumulation of wealth from the hills." (*On the Improvement of Grass Land*, pp. 5, 14, 23).

"In descending the Jura mountains, which divide France from Switzerland, the very first pasture you find on the descent evinces the

value placed on the mountain floods by the inhabitants of those districts; and, accordingly, every stream is sedulously directed and conducted over the pastures in a most skilful manner. The very washing of the roads in hasty rains is also attended to and applied to the same purposes." This system of catching the uncertain flood-waters is known amongst farmers by the name of *catch-work*, and though highly valuable, yet they deem it infinitely less important to them than irrigation, which is watering (generally five or six times a-year) from a certain and ever-accessible head of water, as a river, &c. And yet Lord Western's testimony is decisive in favour of even one *catch-flooding*; for he observes, when speaking of the expense of constructing the requisite little channels to disperse the flood-waters over the grass,—“In many cases it will be trifling, in some cases considerable; but when the farmer reflects that one winter's flooding will do more in *many*, I say in most cases, than thirty loads an acre of the best rotten dung manure that can be laid upon his grass lands, he can hardly shrink from some considerable expenditure.” If, then, the effects even of a *catch-flooding* with water are so great, how infinitely superior are the advantages capable of being derived from a regular constant supply of the enriching foul waters, like those issuing from the drains of a large city, and which are even now most successfully employed near Edinburgh, and utterly worse than wasted in the case of London! Whatever may be the value, in an agricultural point of view, of the solid contents of the London sewers, yet, to me, the absolutely liquid portion, for the purposes of irrigation, appear at least equally important.

In conclusion, I would commend to the farmer the question of irrigation as one well worthy of his attention. There are few agricultural themes, in fact, so likely to repay him for their careful investigation as this. And in a national point of view, it may be regarded as one of no mean importance, for by the use of the impure waters of the river, a mass of fertilizing substances are rendered available for the increased fertility of the soil which would otherwise be lost to the country. And although the construction of water-meadows is attended with some outlay of capital, yet when once they are formed, the relative expense of their produce of food is perhaps less than by any other mode of cultivation. The crops of such meadows are not only more copious, but much earlier in the spring than those of any other lands—for I have often seen the lambs feeding off the first crop of grass produced by these meads in the neighbourhood of Winchester when the upland pastures had hardly begun to vegetate. I cannot therefore but regard the extension of these

meads as an object which, in the hands of the accomplished farmers of our islands, would hardly fail of being attended with the highest advantage, for by such means not only are the rich washings of the soil, its most finely-divided earthy and organic matters recovered and restored to the land, but by producing a largely increased supply of early spring and summer feed, a more numerous live stock is supported—thus the farmer is enriched, whilst the land is rapidly fertilized.

14, GRAY'S INN SQUARE,
August, 1843.

MEETING OF THE YORKSHIRE AGRICULTURAL SOCIETY AT DONCASTER.

There is no town better adapted for the purposes and requirements connected with the anniversary and exhibition of a large and important agricultural society than that of Doncaster. Certainly, the formation of a junction line with the North Midland Railway would undoubtedly have afforded greater facilities in the means of conveyance, both to and from the scene of action. The cleanliness and beauty of the town, the superiority of the accommodations, the character of its locality, the excellence of its roads, the capacious breadth of its streets and thoroughfares, contributed to render it peculiarly well adapted for the many required purposes which the interesting occasion called forth. Nor should the spirit and liberality of the town council, and the activity and alacrity of the several local committees acting in conjunction with the council of the society, be disregarded in their endeavours towards the perfection of a scene which abounds with deep interest, with stirring animation, and undoubted usefulness. By the several authorities of the town, indeed, no means were disregarded which could by possibility contribute towards the comfort, the convenience, and the protection of the members of the society and the numerous visitors who thronged the town by their welcome presence. In these respects nothing was left to be desired. The grant of the town council towards the necessary and unavoidable expenses amounted to the sum of £150, besides furnishing the exhibition ground gratuitously, providing an extra police force, barges for the conveyance of stock, with boxes and slings for landing, granting the use of the Mansion-house for the proceedings of the Geological and Polytechnic Society and the dinner of the council, appropriating the steward's office for the use of the society's secretary, and a long *et cetera*.

The spot selected for the exhibition was admirably adapted for the purpose. It comprised an area of eight acres of depastured land, which had been rendered smooth by mowing the deeper portions of the grass, and consequently pleasant to the visitors, who experienced nothing like either mud or dust. The grounds are not only inclosed by a high wall, but by an inner belt of plantings. The arrangements, as to the mode of exhibition, met with universal approbation; and the highest praise is due to Mr. Butterfield, under whose direction the whole has been completed. The pens for sheep and pigs were placed towards the margin. In the centre was a spacious railed inclosure of an oblong form. On each of the four sides of this inclosure stalls for cattle were erected. As each class underwent exhibition, the animals were led into this inclosure, so that the judges possessed the best opportunity of examining the merits of the several competitors, and arriving at the most correct decision. The same plan was adopted with regard to the horses in the further portion of the ground, extending towards the right. The number of stalls and pens was—for cattle, 122; for sheep, 222; for pigs, 58; and for horses, 62. The amount awarded for premiums by the society this year was £545, viz.—for short-horned cattle, £175; cattle of any breed, £30; long-woolled sheep, £82; pigs, £35; horses, £123; shepherds, £10; implements, (at the disposal of the committee), £80; best cultivated farm, £10.

The council have this year increased the usefulness of the society by adding £10 to a sweepstakes of £5 for occupiers, being members of the society, for the best cultivated farm, not less in extent than 100 acres, situate in Yorkshire, and within 25 miles of Doncaster; the second best cultivator to have his stake returned. There were seven competitors.

SHOW OF IMPLEMENTS.

The show of agricultural implements took place on Tuesday, August 1, in the same field as was occupied by the horses. The great importance of giving encouragement to the construction and invention of agricultural implements was not lost sight of by the Yorkshire Agricultural Society on the present occasion, who reserved from their funds for the disposal of the committee the sum of £80 to be awarded to such implements as should appear adequate to their merits. The exhibition, although certainly not containing so numerous a collection as was to be met with at any of the meetings of the national agricultural societies of England, Ireland, or Scotland, comprised implements of every description useful for the general purposes of the agriculturist. However de-

sirable it may be to stimulate the superior and finer breeding of stock—the better rotation of crops, or the effectual drainage of land—no class of improvements possesses greater claims upon the patronage of agricultural societies than do those effected by the mechanic, whose exertions, talents, and zeal have been called forth to produce implements which shall, in the shortest space of time and most efficiently, prepare the soil for the reception of the seed, or the manure necessary for its growth. Unless the land is properly prepared, the soil sufficiently pulverized, and every description of plant injurious to the good growth of the grain, pulse, or grass of its future crop extirpated, the exertions of the husbandman will be unavailing; but by the use of proper agricultural implements, together with a skilful and intelligent cultivator and a favourable season, all the advantages of an abundant crop may be secured, and much of the labour obviated. It is then, in a great measure, by the use of machines of surpassing skill in execution and contrivance that the agriculturist will be enabled to regain his position in the march of intellect, along with the skill and enterprise of the manufacturer. Much has been done within the last few years in the mechanics of agriculture, yet still much remains undone; and doubtless what has been accomplished has arisen from the congregating together of the agriculturists and mechanicians in different parts of the empire.

AWARDS.

Judges—R. M. Jaques and P. Stephen, Esqrs.

Mr. R. Hornsby, Spittlegate, Grantham, corn-drill, £7, and turnip-drill, with improved lever to throw out of gear, £3.

Mr. Thomas Hunter, Ulcely, Barrow-on-Humber, two-rowed turnip-drill, £4.

Mr. James Smyth, Peasenhall, Halesworth, two-rowed turnip-drill, £3.

Mr. William Crosskill, Beverley, clod-crusher, £8.

Mr. Richard Clayburn, Uley Works, Dursley, Gloucestershire, patent corn-crusher, £5, and straw-cutter, £5.

Messrs. White, Leith and Co., Worksop, corn-crusher, £3.

Mr. Green, Doncaster, an assortment of weighing-machines, £1.

Mr. Thatchell, Midsomer Norton, Bath, self-acting drag, £3.

Mr. Hornsby, cake-crusher, £3.

Mrs. Cartmell, Liverpool, ditto, £4.

Mr. Grant, Stamford, lever horse-rake, £5.

Mr. Coates, Richmond, Scotch cart, and improvement in the formation of the tire, £2.

Mr. Crosskill, Carson's patent syringe for salting and curing meat, £1.

Mr. Dean, Birmingham, an assortment of hand grinding-mills, £3, and iron horse-power mill, £3.

Messrs. Barrett and Ashton, Hull, the first plough, £6.

Mr. Scurrah, Crakehall, Bedale, second plough, £4.

Mr. Clayburn, a cultivator or scarifier, £5, and a dynamometer, £2.

Mr. Squire, Hatfield Woodhouse, Doncaster, a barley-foultering machine, £1.

MEETING WITH THE GEOLOGICAL SOCIETY.

According to a preconcerted plan, on Tuesday afternoon a combined meeting of the Yorkshire Agricultural with the West-Riding Geological and Polytechnic Society was held in the front room of the Mansion house, for which meeting tickets had been freely and gratuitously distributed to all who would accept of them.

On the motion of Earl Spencer, the Earl Fitzwilliam took the chair. His lordship then proceeded to open the business of the afternoon. He said the meeting was of course aware that they were there by the invitation of the Agricultural Society of Yorkshire, who were desirous of meeting them, and on what he considered good sufficient grounds. When we viewed the operations of agriculture, or indeed of any other practical application of science, it could not escape the most careless observer how every one of those sciences tended to advance the interest of the others—how each calculated the strength of the arguments by which each science maintained its propositions—and how each tended to elucidate and explain the objects of the other. Every one of the sciences was made subservient to the others, and the whole when joined together formed the grand structure of human science. At first sight it might appear that they had little to do with the operation of agriculture; and yet when we came to observe how much agriculture was conversant with the soil, we should see the importance of the connexion; and when we looked a little further we should see how much the surface of the soil was affected by the interior structure of the earth: we should find that some soils which had a precisely similar surface, had, nevertheless, a totally different effect in producing vegetation—a difference which we should find arose from the nature of the strata of the subsoil on which the surface rested. Hence it appeared that a geological acquaintance with the interior structure of the earth was highly necessary; and though on the first view such an acquaintance might appear to be more useful to those whose business it was to penetrate into the earth, and extract from it those metals and minerals, the value of which was so well known; yet, it might also be applied to the advancement of the science and practice of agriculture. Therefore, it appeared to him that this Geological Society had acted in no wise improperly in uniting, to the present investigation, another society which might appear little conversant with the objects in view; but he trusted that an opportunity would be afforded, on the present occasion, to show that the objects which the geologist professes were not a little calculated to advance the interests

of the practical agriculturist. On the other hand, they had been most happy to meet the invitation, because they were desirous of showing that there existed no jealousy between the particular branches of science, but that they were wishful to contribute to the advancement of each other. These considerations led him a little further; and while we saw that the geologist might advance the interests of agriculture, we should find that geology was assisted by others who were speculating in scientific matters—as for instance botanists. Although the geologist was conversant with the formation of the earth, his knowledge would be inapplicable unless he called in the aid of the botanist, to classify those productions which the surface of the earth presented to view. Thus it was shown how each science derived assistance from another: by the interposition of geology the advancement of agriculture was attained—and thus did all sciences tend to strengthen and elucidate each other. Then we came to that great science upon which the interests and the destinies of mankind depended—that science which was sometimes the object of jealousy, (because, perhaps, it was not yet sufficiently known), and which sometimes excited the animosity of those who were engaged in the affairs of men—that science which explained the laws which governed all classes of the community—that science which is called political economy, but which was, in fact, nothing more than an explanation of domestic economy on a large scale; for the economy of politicians differed only from that of each individual as his public differed from his private affairs. The knowledge of political economy differed not from the knowledge of individual family economy, except inasmuch as the one was conversant with the affairs of society at large, whilst the other was conversant with the affairs of an individual. Now all these sciences were connected together; and there could be no doubt that great benefit would be derived when all these particular sciences and their particular branches came together for the purpose of throwing light on their various pursuits. On the present occasion a member of their society—one who had frequently had the kindness to favour us with his speculations—had undertaken to read a paper; and he (the noble chairman) felt sure they would be deeply interested. Mr. Thorpe proposed to read a paper on “The Indications which are Guides in judging of the Fertility or Barrenness of the Soil.” This was a subject of considerable importance even to those in such an advanced state of society as this country was; but of how much greater importance was it to those who occasionally turned their attention to places where civilization was just beginning to cast its hooks, and where it was of the

greatest possible importance that some sound principles should be established by which the first difficulties of civilization might be avoided, and by which might be afforded to the colonists the means of forming a correct knowledge of the character of the soils on which they were engaged. There could be no doubt that much unprofitable speculation and much bitter disappointment might have been avoided if, in the selection of proper sites for the early establishment of colonies, those who were engaged in these affairs had been enabled by the proper application of sound principles to discover those localities where the particular nature of the soils offered the greatest advantages. And much disappointment would have been spared those who had been successful in colonization if they had been sufficiently armed with that kind of knowledge which would have acquainted them with the nature of the soils on which their operations were founded. He, therefore, considered it a matter of very great importance that sound principles should be laid down; but such principles could only be acquired by vigorous practice, by the induction of sound knowledge, and by the laying down of sound rules to aid them in judging of those facts which were likely to lead them to true conclusions in their investigation of the different soils. In conclusion, the noble earl said he felt quite sure that they would hear with great satisfaction the paper to be read by Mr. Thorpe; and he would, therefore, now introduce that gentleman.

The Rev. William Thorp, of Womersley, then read a paper "On the indications which are the guides for judging of the fertility of soils;" but from the manner in which it was read it was utterly impossible that any reporter could do it the justice of giving even an outline.

At the conclusion of the paper, Mr. Pusey rose to propose a vote of thanks. He then observed, that having travelled through different parts of the country, he had noticed yesterday in the Isle of Axholme, similar sand land to what he had seen in Somersetshire. He described some cold clay on his own farm which he thought was the most obstinate clay in the world, and which could not be ploughed with less than four horses. He was, however, not prepared to make any lengthened remarks, and should, therefore, merely propose a vote of thanks to Mr. Thorp for his able lecture.

Lord Morpeth was received with cheers. His lordship said he rose to second the motion. He possessed no knowledge to bear out the importance of the subject; and what tended more to his regret, he was not connected with any property which would enable him to make an examination as to the truth of what had been stated with respect to the

land in this neighbourhood. He should, therefore, confine himself to the mere fact of seconding the proposition.

Earl Fitzwilliam having put the motion, which was carried unanimously, said it was desirable that they should raise a discussion on the subject. He would, therefore, address himself to Mr. Pusey. His lordship then entered into a statement on the subject of geology. He, too, had something to do with strong clay land, and he thought it would not be difficult to prove by it that there was land which could not be ploughed by two horses. If they examined the clay lands of the West Riding of Yorkshire, they would find that some portion of a sandstone formation had insinuated itself into the clay, which was superincumbent upon it. And the formation of the strata caused a peculiar character in natural productions. In travelling through one part of the country they would perceive that the timber was ash, and that there was scarcely an oak to be seen. Ash, then, became an indication of the oolitic range; this, however, was not destitute of oak, although ash was the more peculiar and natural. And even there was a great difference as regarded oaks. The broad-spreading oak of Northamptonshire was very different from the tall spiry oak of the West Riding of Yorkshire, which was easily accounted for by the difference of the sub-strata. And there are points by which it appeared to him that timber trees became indications of the soil on which they had been produced.

Mr. Pusey said he much regretted that he could not assist in promoting a discussion; and gave as a reason that he could not but agree with every syllable that Lord Fitzwilliam had spoken.

Earl Spencer rose to propose a motion, which he was quite sure would be most readily acceded to by all present—"The thanks of the meeting to Lord Fitzwilliam for taking the chair, and for the manner in which he had gone beyond his duties in taking such a part throughout the proceedings."

Mr. J. W. Childers, M.P., seconded the motion, and expressed his gratitude to the noble earl for coming to preside over the meeting. He felt convinced that both these societies would work together for good, and be crowned with the greatest success.

The motion was put and carried with cheers.

Earl Fitzwilliam expressed his gratitude for the manner in which the motion had been received. He was glad at any time to promote the interests of the two societies, the nuptials of which they were now met to celebrate, and which he trusted would tend to the future welfare of both.

THE COUNCIL DINNER

Took place in the Mansion-house, on Tuesday afternoon. About one hundred and seventy gentlemen sat down. Earl Spencer in the chair.

Grace having been said by the Rev. Dr. Sharpe, and the usual loyal toasts having been proposed, the noble chairman then rose, and addressing Mr. Charles Howard, of Melbourne, near Pocklington, the late secretary to the society, stated that in consideration of the services he had rendered, and to show how duly they were appreciated, a selection of useful plate raised by private subscription would now be presented to him; the chairman begging him to come forward and accept it.

Mr. Howard then approached the table, and, in accepting the handsome present, tendered his sincerest thanks.

The noble chairman then gave "the health of Mr. Howard."

Earl Spencer said that the next toast which he had to introduce to the meeting was "The health of the president of the society, Lord Wharmcliffe."

Earl Spencer then rose and said, that one of the great objects of this society, and one of the matters which rendered it useful to the country, was the bringing together practical men to discuss the subject of their farming proceedings, and thus impart to one another the information which each was enabled to give. With this view it was most desirable that it should be a rule to discuss after dinner, when they met together on an occasion of this sort, some useful practical subject. Attempts had before been made to get up discussions, but it had happened, that when attempted without previous notice, they had generally failed; first, because practical farmers were not in the habit of attending public meetings, and were, consequently, not able to give such information as was required. Though he claimed for himself, in a certain degree, the name of a practical farmer, especially in the rearing of stock, yet he had not the vanity to put himself in comparison with those who had been brought up to farming from their youth. The misfortune of attempting to get up a discussion of this sort without notice was, that men who had a knowledge of the subject were unwilling, and perhaps unable, to speak without notice, and the men who were able to speak had not sufficient knowledge. The council had, therefore, thought it right to provide against the difficulty, by giving notice last year that certain subjects should be discussed on this occasion. Now, he had suggested last year that one subject for discussion should be the rearing of calves. It was a subject to which he had paid the greatest attention, and, therefore, it

would only be considered right that he should begin the discussion on the present occasion. He should therefore state what his practice had been on this subject. He had two farms of a very different description. One of them was his farm at Wiseton, in Nottinghamshire, where he had scarcely any good land; and on his farm in Northamptonshire he had scarcely any bad land. He reared calves on both farms, and the treatment he gave them was, of course, very different, but they produced an equal result of success. He thought it right to state what those results had been. At this time last year he had 102 cows and heifers old enough to breed from; the produce of which had been 85 calves during the year, 80 of which were now alive. On his farm in Northamptonshire he had only 20 cows at the same time last year old enough to breed from; the produce being 14 calves, all of which were now alive. He was afraid that some would say his was an expensive practice; but he still thought, that if bred upon poor land, that practice which produced a large number of healthy calves was the one which ought to be adopted. His practice in Nottinghamshire, was, that in the first three months the calves should be kept upon new milk; the next month upon new milk and skim milk, and the next three months upon skim milk mixed with boiled linseed. Now the practice which he adopted in Nottinghamshire was to put a seton through the dewlap of the calf, in order to prevent the disorder called the quarter evil, such a thing as was scarcely known in Northamptonshire. In the latter county the calves had no new milk after the first three or four days, but they were at first fed upon skim milk. After six months his calves were put entirely upon grass, and in winter upon turnips; but they were obliged to give them a quantity of meal pretty nearly to the end of the first year. He had now stated his views of the case; and if any other gentleman had a wish to make any remarks he should be happy to hear him, and he should himself have an opportunity of making a few further observations by way of reply.

Earl Fitzwilliam rose and said, as his noble friend had not been successful in eliciting any observations from gentlemen at the other end of the room, he was induced to rise to make a few remarks. It might however, be supposed that there had been some previous arrangement between him and his noble friend, who was to begin by making a statement, and he was to answer him; but this was not the case. He felt disposed to put to his noble friend what they might call a pinching question. He (Earl Fitzwilliam) was desirous of knowing—and the observation might have occurred to others—why, if his noble friend

was obliged to have recourse to an expensive mode of rearing calves, whether it would be desirable to raise them at all in those districts? A sufficient answer might be given; but undoubtedly it would occur to some that it would be better not to apply land to that particular branch of agriculture. He felt desirous of knowing, therefore, whether his noble friend did not think that it was not desirable to raise calves on his poor land at Nottingham?

The chairman said his noble friend must bear in mind, that although he had stated that the expense of rearing calves was greater in Nottingham than in Northampton, yet he had a sufficient reason; for although it was more expensive, yet if it paid after all, and if he made a profit by raising calves in Nottinghamshire, then he thought that that was a sufficient reason. He had stated that it was expensive to rear calves on his farm in Nottinghamshire, but he thought that his plan was a wise one, inasmuch as it enabled him to raise a larger number than he could otherwise. If he had attempted to rear calves without incurring that expense he might incur the risk of their dying; and of all faults, in either animal or man, that of dying was the worst. He admitted that the expense of rearing calves at Wiseton was great, but he could not apply the land in any way more profitably. He had a large quantity of land in arable cultivation in his own occupation; this was a branch of agriculture to which he did not attend himself, but he paid great attention to his farming accounts, in the correct management of which he had great pleasure. The result of his book-keeping was that he did not make more with his arable land than in rearing calves. He need hardly say that it was a fact that arable farming on poor land was not so profitable as on good land; his land was excessively poor, and there was scarcely a field which was of the same soil throughout. The expense of farming that land was great indeed; but he had no hesitation in saying that the application of this land to the rearing of well-bred calves was the best use to which he could devote it. What was really the difference between his breeding calves in Nottinghamshire and in Northamptonshire? Simply this, that the one was more profitable than the other; and they all knew that farming rich land was more profitable than the farming of poor land. There was another question, which although not directly might indirectly be considered in reference to this subject; and that question was whether the system of breeding in-and-in was good. He denied that it was a mischievous principle, and he could speak from his own experience on that subject. Since he had adopted that plan, during the last fourteen years, he had raised more

calves in proportion to the number of his cows than formerly. The constitution of his calves was better—he had fewer deaths—and more calves. That was his success during the last fourteen years, notwithstanding the breeding in-and-in system which he had practised. He did not believe that there was any merit in the system—but he did think there was not any disadvantage if it was done with judgment.

The Earl of Zetland rose to confirm an observation of his noble friend Lord Spencer, which he had made with reference to the rearing of calves. He could corroborate a part of his statement, and would express his own high opinion of the system of inserting setons in the dewlaps of calves for the prevention of the quarter evil. He could bear testimony to the beneficial result of that experiment, and he might state that he first became acquainted with it when on a visit to his noble friend, at Wiseton, he believed in the year 1838, upon which occasion he enquired of Lord Spencer if he knew of any remedy for the quarter evil. If he remembered truly, he had then, in the year 1838, out of 23 calves lost 6 or 7 by the quarter evil, and in 1837 he lost 9 by the same complaint. His noble friend told him of the plan he had adopted for the prevention—namely, the placing of setons in the dewlaps; and on his (the Earl of Zetland's) return home in the month of September, 1838, he had all his calves operated upon in the manner then recommended. He had, up to the present time, persevered in that system, and he was happy to announce that he had not lost a single calf since he adopted that treatment. So far he had alluded to calves bred upon poor land, and in order that the subject might be fairly investigated, he might state that he had a farm at Aske, which consisted of good soil, and there the quarter evil was of very rare occurrence, though they were not altogether free from it. It was two years since he had tried this system upon the Aske farm; and last year he lost one calf shortly after the seton had been inserted in the dewlap; and it might be held as probable that this occurring so shortly after the operation, there had not been time to produce the requisite effect. He thought it right, as his noble friend was anxious for discussion, to mention this confirmation of the very valuable system he adopted, and which he was so anxious to recommend to others as a complete remedy for the quarter evil.

Mr. H. L. Maw said it might, perhaps, be presumptuous in so young a breeder as himself to offer an opinion on this occasion, when he saw around him so many gentlemen of greater experience than his own; but as none of them had risen, he thought he should not do his duty if he did not speak to the small extent of his experience. He reared from

twenty to thirty calves in a year, in different ways, and on two varieties of land, some exceedingly bad, and some pretty good. The animals he reared for breeding purposes, for bull calves or breeding heifers, were reared by adopting the natural plan—that of letting them suck the cows; the others, that were reared as steers or cattle for the butcher, were fed for a few weeks, according to circumstances, on new milk or skim milk; they were turned out to grass in summer, taken up at night, and in winter had hay and turnips. His lordship's observation and experience with regard to breeding in-and-in would put a stop to the expression of any opinion on that point; but, as far as his (Mr. Maw's) experience had gone, there were two objects contemplated by breeders,—one to raise the animal in such a way as would best develop its natural points and characteristics—the other to raise them in such a manner as would be most profitable to the producer. With a view to the former object some extra expense may be incurred, but to the latter the greatest economy was important, especially in times like the present, when it must be the object of farmers to raise as much stock as possible. If a person did not breed calves himself he might purchase them, and by a little labour on the part of himself and family, in a year or two he would have a going-off stock, which would contribute much towards enabling him to raise his rent. The stock so bred would enable him to improve his tillage in quantity and quality, and by applying it to his farm it would enable him also to raise a greater quantity of corn than he possibly could do without it. With the small farmer, he thought one principal difficulty was the raising of green-crops and the consuming of them. The expense of tillages, they said, were so great that they could not bear them; his opinion was, that a farmer should always raise his own tillage, and thereby enable himself to increase the quantity of corn that he may bring to market. They said they could not afford to buy tillage; let them then raise it themselves; and if they could not afford to buy stock let them rear stock. He should be glad if they could, by any means, induce farmers generally, especially small farmers, to increase the number and improve the quality of their stocks, thereby enabling themselves to raise a greater quantity of tillage on their farms, and by increasing the quantity of beasts and of corn produced, greatly promote their own advantages.

Mr. Colman, a gentleman from America, here proposed a series of questions bearing upon the rearing of calves, to which

Earl Spencer replied. Mr. Colman had put three questions to him, and he (the chairman) would answer him according to his experience

and practice. With respect to the age at which a heifer should breed, in his opinion it ought not to be before it was two and a half years old. He thought it would be imprudent to allow a heifer to breed before that age; and he thought if the breeding were delayed beyond that time, the animal would be most likely to get so fat as not to breed at all. With respect to the next question, his practice had always been with calves born previous to the end of June to turn them out to grass. If calved before the latter end of summer, or the beginning of autumn, he turned them out to grass next summer, but if calved in the spring he turned them out immediately. He did not allow the calf to suck beyond two or three days; he thought it desirable that it should remain with the cow two or three days, during which period the calf was licked by its parent, and this was exceedingly beneficial to it. After that process the general rule was to take the calf away and give it some new milk—not to let it suck. He had tried the other method, but found the calves were always more backward when taken from sucking, than when taken from new milk.

Mr. E. B. Beaumont next rose, and offered a few observations on the plan which he adopts in rearing calves. With regard to the breeding in-and-in, he attributed the success which had attended Lord Spencer not to the principle of in-and-in breeding, but to his lordship's own care and management. Whether or not his lordship had had success in in-and-in breeding, he was sure they would all agree that his lordship had out and out the best stock in the country.

The chairman said that to a certain extent he thought they had been successful in raising this discussion, and he thought they were now entitled to have a toast. He had one to offer, which he was sure would be drunk with satisfaction, after the proceedings which they had witnessed and taken part in that morning. The toast was "Success to the Yorkshire Polytechnic and Geological Society." That society joined them at Hull, and again on this occasion at Doncaster, and both times great interest had been excited by the lectures which they have heard. It was his desire that those societies should work into each other's hands. Their friends were enabled to give them great information; and probably in return they might gain something from the agriculturist as to the effect of cultivation on different soils.

Earl Fitzwilliam rose to thank the company for the honour they had conferred upon the society of which he was the head. His noble friend had observed that he thought it would be mutually advantageous to such societies as theirs, to have occasional opportunities of meeting.

together. Entirely agreeing in that opinion, he had ever been desirous that the two societies should come in contact with each other; for he believed that by it great advantages would be derived, and mutual instruction pass between the different parties, and he would endeavour on the present occasion to make some exemplifications of the manner in which they could be made subservient to each other. He had spoken this morning, and had dwelt on the advantages of a connexion between science and agriculture; and he contended that all branches of scientific knowledge ought to be thus brought to bear upon each other. They sometimes heard of practical questions; but no practical questions could be properly established unless they had recourse to sound theory. They sometimes heard of persons who said the opinions of theoretical men were unworthy of regard; and that those of practical men only were such as could be relied upon. It appeared to him that such persons misunderstood the meaning of the two terms. Practical opinion was a proper application of sound theory; and sound theory was the result of a great number of practical observations. If a man's theory was founded on a number of observations or facts, and an adverse opinion was propagated, he should say that the theory founded upon practical observation was sound, and the adverse theory unsound. A man could not have sound practical conduct unless it were founded upon a number of practical observations. This clearly proved, that, with respect to the advantages of the different societies, they should always be placed in juxtaposition; and he should show how it was requisite that the farmers should have a knowledge of geology. He supposed that no one in the present day who had practised draining would deny that the great improvement in land had been effected by that process. He apprehended that no farmer of these days entertained any doubt on that subject. The question was, whether any other water than that which fell from the heavens was beneficial to the land. There was a doubt whether any of the water which perforated through the various strata of the country, from reservoirs at a distance immeasurable, and almost inconceivable, was that which nature required for the moistening of the land. He apprehended that this could not be satisfactorily decided upon without the assistance of geology. And it must be called to the assistance of the agriculturist before the greatest improvement of the land could be effected. He would illustrate how it was that geology was to be applied in fixing this question. It was necessary, in order that the draining might be constructed upon scientific principles, that they should have a proper knowledge of geology. They must have

correct information as to the position of the subjacent strata, in order to deal with the water which was under the surface of the soil. It frequently happened, as many present were aware, that in various parts of the country were found oolitic formations, which on a cursory view had the appearance of being dry soil; but it was deceptive, and generally there was a great quantity of water continually perforating through it. Besides this formation through which the water perforated, there was often found a dyke or dam of clay, and wherever this occurred it stopped up the perforation of the water; and the consequence was that in laying drains a great deal of caution should be used, or the water might rise to the surface and do much mischief to the land and to the crops thereon. They might go on eternally making drains if they did not cut through this dyke of clay; for they would be entirely ineffectual. It required, therefore, that agriculturists should be acquainted with the nature of the particular strata and their situations; and the necessity of this had been clearly proved to his own observation. This appeared to him to be a very practical illustration of the necessity that existed for farmers to have a knowledge of geology; and therefore the value of the connexion between agricultural and geological societies must be fully established. He would detain them no longer than only to express the gratification which the geological society had experienced in meeting with the members of the Yorkshire Agricultural Association, and he would express a hope that such places might be selected for their future meetings as would be convenient for the members of both societies.

Earl Spencer rose and said he had now the pleasure to state the award of the judges for the best cultivated farm. The premium of £10 added by the society to the sweepstakes of £5 each, was given to Mr. R. C. Johnson, of Chevet Grange; and the returned stake to Godfrey Wentworth, Esq., of Woolley, as the second best cultivator.

Mr. H. S. Thompson then rose and said, he was glad to have the pleasure of opening the next subject for discussion, namely, "the best mode of treating farm-yard manures;" and in doing so he should address himself to two questions: first, how to make the greatest quantity of manure; and second, what was the least expensive mode of collecting it? With reference to the first question then, the plan he adopted was to have a pit dug in the earth, in which to throw the manure, instead of having it piled up in a heap. When the land favoured the farmer by being in a sloping direction, the manure might be let out at the lower side of the pit. There was a small tank at the bottom of the pit, and a little loose soil; the soil absorbed all the gases that would otherwise

escape, and the tank received the drainings from the pit ; these drainings were poured over the pit, so as to keep its contents moist, and in proper condition. It was usual to collect all the vegetable refuse, and carry it along with the farm-yard drippings into the pit. In this way on this farm, which consisted of about 200 acres of arable land, all the couch grass, stubble, and weed had been collected, and laid at the bottom of the manure pit, and when well moistened had increased the quantity of his manure to 200 loads, which gave him four loads per acre for fallow crops, and he would leave them to judge of the advantages he gained. If they made a manure heap the essence evaporated from the surface, and the drainings escaped from beneath long before the manure was wanted ; whereas, if they had a pit, the manure would be completely protected from those losses, and it would be constantly ready to take out. They always observed that a good cook took care to give her meat plenty of basting, and so it is with the manure pit, for it was an essential point in the keeping of good manure to have it constantly basted with its own liquor. There was one other matter with regard to this subject ; if they wanted to use the manure in a short time after its deposit in the pit, the best plan was to cover it lightly over with soil. If, on the other hand, they wished to preserve it, the pit gave them the advantage of keeping it a great time without the nature being at all injured ; they might keep it for six months, and at the end of that time it would be as fresh as at any less period. If they wanted to use it in a short time, it would be advisable to expose it to the action of the air, but not to allow any undue or excessive fermentation. The manure soon became fit to be used for any crop, and, if wanted very soon, it should be covered very lightly, and be watched well and watered often. In very dry times the drainings that run from the manure were not sufficient for moistening it ; and the farmer would be obliged to saturate it with some other liquid. In that case if the farmer had any other tank on his premises in which to collect the drainings of the farm-yard, it would be best to use the contents of the extra tank for moistening the manure ; and if he had no such tank, then it was advisable to use plain water, which, after passing through the superincumbent mass in the pit, became very good and effective. Having explained the main points of his subject, the next question—and he freely admitted it was the most important—was the expense of properly collecting the manure. But in this respect, the expense of a manure pit was not like the expense of machines, which, whether they were adapted to large or small farms, were the same expense ; thus a thrashing-machine cost the same money, whether it was to be used for

a farm of a hundred or a thousand acres; but a manure pit might be proportioned to the size of the farm on which it was made, or the probable quantity of manure it was intended to hold. They had to look a little way down the soil about the place intended for the pit; if they were near a sandy loam, the plan was merely to put to it a little plain sand; and he assured them that this method afforded a great advantage at a very little expense. The pit should be narrow and deep, because in that case it might be taken out with a pail, and would afford greater facilities in the moistening operation. In making a pit where the land was a strong clay, nothing further was required than making the requisite opening, for the clay would of itself retain the moisture. His farm was a porous soil, being a red sandstone; his pit was made by putting two large poles into the hole, and to these were nailed some rough slabs; on the other or outer side a quantity of clay was put in, and this construction answered exceedingly well. Something might be said about the expense; but a couple of men in two days made his pit, which was sufficiently large to hold 300 loads of manure.

Mr. George Legard, of Fangfoss, said he was rather anxious that some gentleman should have taken up the subject who could have spoken to it more satisfactorily than himself; but as no one appeared desirous of rising, he would say a few words on his own practice on the point proposed for discussion. First, with respect to the extremely interesting facts which they had heard from Mr. Thompson, of making a tank near his farm-yard, and putting in the manure and soil, and so making a sort of pie on it, was extremely good; but it much depended for its practicability on locality. The practice he and his neighbours pursued was, in the month of June or July to lead the manure out of the farm-yard, and place it upon a heap, on the surface of which they spread a quantity of gypsum, which had the effect of preventing the juice from escaping. With respect to the tank, he was quite willing to admit that it was a most valuable thing, and it ought to be adopted wherever it was practicable. By not allowing the liquid to escape, the benefit of valuable fluid was secured. There was one point upon which he should be exceedingly glad that a discussion should be raised, which was, whether it was most desirable to use recently made manure, or manure of at least a year old. It was a point on which much, though not enough, had been both said and written. His own practice was to use manure of a year or rather more than a year old, and from the practice there appeared to him to arise various advantages. In the first place in using manure which was properly consolidated, it was a security against sowing

noxious weeds. From the use of recently made farm-yard manure, there was a tendency to cause thistles to grow, in consequence of the seeds which were mixed up with it, which would be destroyed by keeping it so long as a year. If they took care that the manure heap be made as solid as possible on this plan, he did not see how the juice of the manure could escape, even in the absence of a tank. The relative effects of new and year-old manures he thought a very important consideration; and it was therefore a point on which he hoped that some new facts would be elicited from gentlemen in the meeting well qualified to treat on the subject. His object in rising was merely to mention a few facts with a view to raise a discussion, rather than to offer any remarks of his own.

Mr. Divett, M.P., was understood to say that he had great doubt as to whether it was desirable to return the liquid manure into the tank. He had seen the most extraordinary effects produced by the application of that manure on to the lands. In his own belief it was better to apply the liquid manure on to the land; and to bestow on the manure heap a copious supply of water; not so much to soak it as always to keep it damp. As to the time which the manure should be kept before it was laid on the land, he believed that scarcely any time would destroy some of those seeds which produce their most noxious weeds; and he was of opinion that some steps should be taken to destroy them by fermentation. He strongly doubted the benefits which Mr. Thompson held out from the system which he pursued of throwing grass and other vegetable matter to the bottom of his pit, if it was not attended with some steps for the destruction of noxious seeds. So far as he had seen the effects which had been produced by liquid manures they were far greater than those produced by manures of any other sorts.

Mr. Beaumont, of Finningley, said he had put a small quantity of clover seeds for three months into a manure heap; he afterwards took out that seed, and upon sowing it every one of the seeds grew up. Another small lot of seeds he placed in a state of fermentation, and then sowed them, but not one of them grew. He stated this fact, as affording evidence that there was a ready mode of destroying seeds, and thus preventing them from again vegetating. He strongly advocated the use of tanks for manure. By this means he believed that they would double their produce, and put an end to the necessity of bone-manure. He mentioned a remarkable experiment of his own to prove that assertion. He had an eight-acre field, to which he applied liquid manure, and it produced seven loads per acre, whilst from the remainder he had only three loads. This was entirely to be attributed to that application.

Mr. W. Torr, *jan.*, of Riby, said that the observations which had fallen from Mr. Thompson were chiefly applicable to the small farmer; but to the tenant farmers who occupied large farms, his plan of excavating for manure heaps would involve a large expense which ought to devolve upon landlords. One great error fallen into in large farms had been the want of stock to consume the green crops into manure; and with persons so circumstanced the question had been, not how they should water and otherwise preserve the manure, but how they should produce it. For fold-yard feeding he recommended the formation of a concave fold, so as to hold the moisture; and if they would mix with ordinary food a certain proportion of oil-cake per day it would yield the means of fermentation amongst the manure, and then they would have very little need for creating artificial moisture. Mr. Legard had spoken of the difficulty of getting soil in the Wold countries to mix with the animal manures; but he thought such a supply might be obtained when they were laying down their wheat lands, without the necessity of dressing ditches, or resorting to other means for a supply. And as to what had been said respecting new and old manures, it appeared to him almost madness to keep manure for a long time, especially after it had been well made. If they kept good farm-yard straw in a manure heap composed of nothing but the produce of good straw, then it would be the same next year as at present; but if they used oil-cake the manure was necessarily filled with volatile alkalis, which must be used sooner. And as to the risk of generating weeds by the use of newly made manure, he begged to observe that a great many seeds might be kept in manure without vegetating, especially if kept from exposure to the atmosphere. Mr. Torr concluded by some general observations on the value of farm-yard manure. He said that when the system of manuring with bones was introduced into Lincolnshire, common manures were very much neglected, and the farmers said they would not have them for two miles' leading; but they had seen their mistake, and had now come back to a pretty general concurrence of opinion as to the value of those manures.

Mr. H. S. Thompson adverted briefly to some objections which had been urged by preceding speakers, to some of the suggestions which he had thrown out in introducing the subject. Mr. Divett had objected to the liquid manure which had drained from the heaps being returned to the dunghill, as he thought it had better be laid on the land as liquid manure, and thereby effect a saving in that respect. But the first object should be to make the manure good, and that it could not be if

it were too dry; particularly in summer, and in cases where a great deal of it happened to be horse-manure. They must have something to keep it going; and if they spoilt their manure by making it too dry, they would not be compensated by spreading on the land that which drained from it. The manure heap should be kept warm and moist, but not wet; else the substances composing it would undergo no material change. If this plan would answer on small farms, as seemed to be admitted, he was sure it would answer on large farms. With respect to the germination of the seeds of weeds, his experience accorded with the practice of Mr. Beaumont; and he was satisfied that a short period of fermentation was sufficient to kill the seeds of weeds.

Mr. Colman asked permission to detail a few particulars in regard to his practice, which was, to have a barn cellar several feet deep, under the whole barn or stable in which he kept his cattle. This he had well puddled with clay so as to be waterproof, and at the same time he had holes of communication through which the liquid manure produced by the cattle might run. In this cellar he put all the manure that fell from the cattle, and all the vegetable refuse of the farm. In looking over the English farms he had felt a degree of surprise in not seeing more preparation for the preservation of manure than he had yet found. He had seen in many farm-yards the manure thrown out promiscuously, and left uncovered, exposed to the air, the sun and rain; and he was satisfied that this mode of preserving manure was improvident, and that no farmer could conduct his business well unless he had a vault, in which his manure could be put and prepared. He should advise every farmer to have a place of deposit into which his manure, liquid and solid, might go; and if he did this, he would find in it a bank of deposits, whose discounts would always be liberal.

One or two toasts followed, and the meeting broke up.

GRAND EXHIBITION, WEDNESDAY, AUGUST 2.

This, the great day of exhibition, drew together, as had been anticipated, a larger concourse of visitors, desirous of participating in the numerous attractions with which the show-grounds abounded, as well as the proceedings connected with the pavilion dinner, than had ever been witnessed in Doncaster on a similar occasion. Lord Spencer was in the grounds by five o'clock, and took an active part, in association with the stewards, in the arrangement of the stock. As arrival after arrival took place, the competitors were placed in the quarters which had been previously formed for them; and this part of the proceedings

was conducted in the best manner. The several classes of animals were admitted into the grounds until seven o'clock, the hour appointed for closing the gates; but many that had arrived after that hour were shut out. The horses, however, were admitted, agreeably to previous announcement, at the Broxholm Lane entrance, up to ten o'clock.

Between seven and eight o'clock the judges commenced their labours with the aged bulls, yearlings, and calves. Then followed the shearing rams, the aged rams, the ewes, &c.; while the judges for horses commenced with the mares and foals, hunting geldings or fillies, &c., until the whole of the prizes had been awarded. The visitors' entrance doors were opened at ten for members and the higher amount of tickets; and at twelve for one shilling tickets. The avenues leading to the scene of action were crowded; and some idea of the throng may be formed when the fact is stated, that about five thousand persons visited the grounds, sharing in the many attractions which were spread on every hand, marking the superiority or excellence of the stock and the ingenuity of the implements. The tickets sold amounted to about £350.

More stock was entered for competition than was exhibited; yet still the display was very large. The late meeting of the Royal Agricultural Society at Derby might boast of a more numerous exhibition, still, after excluding the Devon and Hereford classes, the show on the present occasion was superior. Indeed, a finer display of short-horns of the purest breed was never before collected together. The bulls in class 1 were not, in the opinion of some, so good as in former years. The first prize was awarded to Mr. Thomas Forrest's Symmetry. We subjoin the pedigree.

Roan, calved February 28, 1839, bred by and the property of Mr. Thomas Forrest; got by Doctor (3596) d. (Mary) by Matchem, (2281) g. d. (Vestris) by Young Houghton, (1119) gr. g. d. (Cato (119) cow) by Cato (119) gr. gr. g. d. by Jupiter, (342) gr. gr. gr. g. d. (Young Gaudy) by Pope, (514) gr. gr. gr. gr. g. d. (Gaudy) by Favourite, (252) gr. gr. gr. gr. gr. g. d. (Fortune) by Bolingbroke, (86) gr. gr. gr. gr. gr. g. d. by Foljambe, (263) gr. gr. gr. gr. gr. gr. g. d. by Hubback, (319).

The second prize was awarded to Mr. Thomas Bates's Cleveland Lad Second.

Roan, calved March 23, 1838, bred by Mr. Bates, Kirkleavington, the property of Mr. Burnett, Black Hedley, Northumberland; got by Short Tail, (2621) d. (Matchem cow, bred by Mr. Brown) by Matchem, (2281) g. d. by Young Wynyard, (2859).

In class 2, yearling bulls, there were many beautiful and exceedingly good animals. A white bull, by Sir Thomas Fairfax, the property of the Rev. J. D. Jefferson, together with a roan one, The Sliding Scale, the property of Mr. John Collins, of Danthorpe, Hedon, were, in addition to those which received the prize, very superior. In the bull calves, class 3, and the bull of the previous class, there was decidedly the best competition, especially in the former. The one belonging to Mr. Parkinson, of Leyfields, which obtained the first prize in class 3, was a most splendid animal. In proof of this it need only be mentioned, that it was sold for 200 guineas to Banks Stanhope, Esq., Reevesby Abbey, Horncastle. The one shown by Mr. Whitaker, was, in some respects, equally fine. The cows in calf or milk in class 4 were not altogether of that valuable description which might have been expected, or as the importance of the class demands.

The show of three-year old cows or heifers was not large. H. Watson, Esq., of Walkeringham, exhibited a fine roan-coloured heifer (Princess Royal), as also did John Hutton, Esq., of Sober Hill. In class 6, for two-year old heifers in calf, there were seven exhibited, although ten were entered. These, however, were not very superior, with the exception of the two which received the prizes. In class 7 Mr. Watson was the successful competitor for the best yearling heifer, with the same animal with which he won the first premium at Derby. Many other very fine ones were also exhibited. The competition for the best heifer-calf was exceedingly good. Amongst the cattle of any breed were two fine red oxen, belonging to Mr. Henry Mann, of Fighburn, near this town, which were remarkably fat, especially the one in class 9, under four years of age. We understand Mr. Mann intends exhibiting this animal at the forthcoming meeting of the Smithfield Cattle Show at Christmas. Mr. John Morley, of Eastoft, showed a most beautiful fat red roan heifer.

The show of both shearling and aged rams was exceedingly good. The competition in classes 14, 15, and 16, viz., for five ewes, five shearling wethers, and five shearling gimmers, was decidedly the best of any class on the ground, and included a collection of sheep, whose superiority for fine and superior breeding, as well as large growth, was never surpassed at any exhibition.

There was a great number of pigs of all descriptions shown, some of which were very valuable either for the purposes of breeding or feeding.

The show of horses was only limited, and far inferior, on the whole, to what might have been anticipated.

PREMIUMS AWARDED.

Judges for the Farm Sweepstakes.—Messrs. Robert Brough, Meltonby, Hull; Charles Howard, York; Wm. Pick, Grasskill, Ouseburn.

For Horses.—Messrs. Geo. Higginson, Hutton Sessay, Thirsk; Richard Nainby, Barnoldby-le-Beck, Grimsby; William Wetherell, Durham.

For Cattle.—Messrs. John Grey, Dilston; Robert Cattley, Stearesby; William Torr, jun., Riby.

For Sheep and Pigs.—Messrs. William Pratt, Newfield Southam, Warwick; Leonard Severs, Oliver, Richmond; Philip Skipworth, Aylesbury, Brigg.

For Implements.—Messrs. Timothy Wheatley, Neswick, Driffield; Peter Stevenson, Rainton, Ripon.

SHORT-HORNED CATTLE.

CLASS 1. Best bull of any age, £25; second, £10.—First prize awarded to Mr. John Forrest, Stretton, Cheshire, near Warrington, for Symmetry; second ditto to Mr. Thomas Bates, Kirkleavington, Yarm, for Cleveland Lad Second.

CLASS 2. Best yearling bull, £20; second, £10.—First prize awarded to Mr. John Beetham, West Harlsey, Northallerton, for Harlsonio; second ditto to Mr. John Forrest, for Cheshire Lad.

CLASS 3. Best bull calf, £10; second, £5.—First prize awarded to Mr. John Parkinson, Leyfields, Newark, for Cramer; second ditto to Mr. Jonas Whittaker, Burley, Otley, for Doctor Buchan.

CLASS 4. Best cow of any age, in calf or milk, £20; second, £10.—First prize awarded to Mr. John Booth, Killerby, Catterick, for Necklace; second ditto to Mr. W. R. Earnshaw, jun., Eastthorpe, Market Weighton, for Mayflower.

CLASS 5. Best three-year old cow or heifer, in calf or milk, £15; second, £5.—First prize awarded to Mr. John Forrest, for Victoria; second ditto to Mr. Thomas Crofton, Holywell, Durham, for Emma.

CLASS 6. Best two-year old heifer, in calf, £10; second, £5.—First prize awarded to Mr. John Booth, for Ladythorne; second ditto to Mr. John Booth, for Birthday.

CLASS 7. Best yearling heifer, £10; second, £5.—First prize awarded to Mr. Henry Watson, Walkeringham, Bawtry, for Myrtle; second prize to Mr. John Booth, for a roan heifer.

CLASS 8. Best heifer calf, £10; second, £5.—First prize awarded to Mr. G. O. Trotter, Bishop-Middleham, Rusheyford, for Boadicea; second ditto to Mr. Henry Lister Maw, Tetley, Crowle, for Sarah.

CATTLE OF ANY BREED.

CLASS 9. Best fat ox, under four years of age, £10.—Awarded to Mr. Henry Mann, Pigburn, Doncaster.

CLASS 10. Best fat ox, under three years of age, £10.—Awarded to Mr. Henry Mann.

CLASS 11. Best fat cow or heifer of any age, £10.—Awarded to Mr. John Morley, Eastoft, Crowle.

LONG-WOOLLED SHEEP.

CLASS 12. Best shearling ram, £15; second, £7.—First and second prizes awarded to Mr. Samuel Wiley, Brandsby, York.

CLASS 13. Best ram of any age, £10; second, £5.—First prize awarded to Mr. William Thorp, Londesbro', Market Weighton; second ditto to Mr. Robert Dawson, Sewerby, Burlington, for his 2 years and 4 months old.

CLASS 14. For the best pen of five ewes, £10; second ditto, £5.—First prize awarded to Mr. William Abraham, Barnetby-le-Wold; second ditto to Mr. J. W. Childers, Cantley, Doncaster.

CLASS 15. Best pen of five shearling wethers, £10; second, £5.—First prize awarded to Mr. John D. Clark, Barnby Moor, Retford; second ditto to Lord Wenlock, Escrick Park.

CLASS 16. Best pen of five shearling gimmers, £10; second, £5.—First prize awarded to Mr. John Creassy, Blyth, Bawtry; second ditto to Mr. William Newham, Edlington, Doncaster.

PIGS.

CLASS 17. Best boar, large breed, £5; second, £2.—First prize awarded to Mr. John Walton Nutt, York; second ditto to Mr. Philip Davies Cooke, Owston, Doncaster.

CLASS 18. Best sow, large breed, in pig or milk, £5; second, £2.—First prize awarded to Mr. Philip Davies Cooke; second ditto to Mr. John Beetham, West Harley, Northallerton.

CLASS 19. Best boar, small breed, £5; second, £2.—First prize awarded to Mr. John Saul, Alverley Grange, Doncaster, for his 10 months old; second ditto to Mr. R. M. Jaques, Easby Abbey, Richmond.

CLASS 20. Best sow, small breed, in pig or milk, £5; second, £2.—First prize awarded to Earl Fitzwilliam, Wentworth House, Rotherham; second ditto to Viscount Galway, Serlby Hall, Bawtry.

CLASS 21. Best three store store pigs, of the same litter, from 4 to 9 months old, £5; second, £2.—First prize awarded to Earl Fitzwilliam; second ditto to Mr. Samuel Wiley, Brandsby, York.

HORSES.

CLASS 22. Best stallion for hunters, £10; second, £5.—First prize awarded to Mr. John Outhwaite, Acketon, Wetherby; second ditto to Mr. Richard Guant, Ingmanthorpe, Wetherby.

CLASS 23. Best stallion for coach horses, £10; second, £5.—First prize awarded to Mr. Richard Tennant, Osgodby, Selby; second ditto to Mr. Thomas Kirby, York.

CLASS 24. Best stallion for roadsters, £10; second, £5.—First prize awarded to Mr. Thomas Cockshott, Cringles, Skipton, for Young Pretender; second ditto to Mr. Thomas Cockshott, Addingham, Moorside, Otley, for Young Gainsborough.

CLASS 25. Best stallion for agricultural purposes, £10; second, £5.—First prize awarded to Mr. George Buckle, Arthington, Otley; second ditto to Mr. George Lane Fox, Bramham Park, Tadcaster.

CLASS 26. Best mare and foal for hunting, £5; second, £2.—First prize awarded to Mr. John Morley, Eastoft, Crowle; second ditto to Mr. Richard Johnson, Goldthorpe, Doncaster.

CLASS 28. Best roadster mare and foal, £5; second, £2.—First prize awarded to Mr. Henry Watson, Walkeringham, Bawtry; second ditto to Mr. William Lythe, Thirsk.

CLASS 29. Best mare and foal for draught, £5; second, £3.—First prize awarded to Mr. James Hepstontall, Hazlewood, Tadcaster; second ditto to Mr. Henry Mann, Pigburn, Doncaster.

CLASS 30. Best three-year old hunting gelding or filly, £5; second, £2.—First prize awarded to Mr. Joseph Smith, Carlton, Selby, for his chesnut gelding; second ditto to Mr. John Ireland, Goole.

CLASS 31. Best three-year old coaching gelding or filly, £5; second, £2.—First prize awarded to Mr. Thomas Wright, Thorp-Basset, Malton; second ditto to Mr. John Littlewood, Armthorpe, Doncaster.

CLASS 32. Best two-year old coaching gelding or filly, £5; second, £2.—First prize awarded to Mr. William Burton, Water-Fulford, York; second ditto to Mr. Wm. Prince, Chapel Haddlesey, Selby.

CLASS 33. Best three-year old hackney gelding or filly, £5; second, £2.—First prize awarded to the Rev. Charles George Smith, Everton, Bawtry; second ditto to Mr. Anthony Webster, Sprotbro', Doncaster.

CLASS 34. Best three-year old gelding or filly for agricultural purposes, £5; second, £2.—First prize awarded to the Rev. Charles George Smith; second ditto to Mr. Robert John Coulman.

EXTRA STOCK.—CATTLE.

£3 awarded to Mr. John Parkinson, Leyfields, Newark, for Sir Thomas Fairfax; £1 to Mr. Richard Booth, Warlaby, for White Strawberry; and 10s. to Mr. John Fullerton, Thrybergh Park, for a North Devon fat ox.

SHEEP.

£1 10s. awarded to Sir W. B. Cooke, Wheatley, for ten fat Leicester ewes; £1 to William Richardson, Great Limber, Caistor, for two new Leicester wethers, aged 40 months; and 10s. to John Walbanke Childers, Cantley, for a five-year old ewe, bred from the flock of Mr. Meggison.

PIGS.

30s. awarded to Viscount Galway, Bawtry, for nine pigs, 17 weeks old; £1 to Philip Davies Cooke, Owston, for two gilt pigs of the same litter, seven months old; £1 to the Rev. Charles George Smith, Everton, Bawtry, for two boars, small breed, 19 weeks old, bred by himself from a boar belonging to Mr. Henderson; £1 to Mr. Samuel Wiley, Brandsby, York, for two sows, 7 months old, small breed; £1 to ditto for a sow, 2 years 6 months old; 10s. to Sir W. B. Cooke, Wheatley, for four boars; and 10s. to Mr. John Walton, York, for a gilt, 11 months old.

SHEPHERD.

To the shepherd, being an annual servant, who shall have lost the smallest proportionate number of ewes and lambs previous to the 12th of May, from those that produced lambs in 1843, the number of the flock not being less than fifty, £5; second, £3; third, £2.

First prize awarded to John Barrick, shepherd to Sir W. B. Cooke, Wheatley Hall; second to Joseph Martin, shepherd to Thomas Eccles, Newhouse, Aldborough, Darlington; third to Edmund Gillott, shepherd to J. Tullerton, Thrybergh, Rotherham.

THE PAVILION DINNER.

The pavilion, situated in Priory Place, was a plain wooden building with slate roofing. It was erected by Mr. Thomas Kirby, of Sowerby, near Thirsk, to whom a premium of £5 was awarded by the society for the best plan. The site for the erection was gratuitously provided by William Sheardon, Esq.

The number that sat down to dinner was about 600. The Right Hon. Lord Wharnccliffe, the president of the council, was in the chair. Sir William B. Cooke, Bart., of Wheatley, occupied the vice-chair. The proceedings, however, are much too long for our available space.

THE CORN LAWS.

Among the vast number of tracts published and distributed by the agents of the Anti-Corn-Law-League, none has attracted more notice than the three letters addressed to Lord John Russell, by Edward Baines, jun., in "The Leeds Mercury" newspaper.

The author's observations are arranged under the following heads, namely—1st, "Objections to a fixed duty,"—2nd, "Reply to the advocates of a fixed duty,"—and, 3rdly, a "Reply to the plea of special taxes borne by the land." All these heads are examined with impartial clearness, and with considerable ability. A better advocate could scarcely be found for defending the positions assumed. He propounds certain principles; but, like the great leader of his cause, he appears wholly indifferent to what may be the consequences of the measures for which he pleads. Cheap food, no matter where, or how produced, is his grand panacea for all the present evils and misfortunes of the country. Under this conviction, he quickly demolishes all the arguments for a fixed duty, by shewing that the smallest duty on imported corn must operate to enhance the prices, check importation, and, of course, increase the price of all the corn of home growth to the full amount of the duty at least. These are self-evident truths, which no one can gainsay; and on which Mr. B. founds some startling calculations, to show that, in consequence of the duty on imported corn, it costs the consumer several millions of money annually; of which but a comparatively small portion goes to the exchequer, while the greater portion is shared among the landholders!

"It follows, then, that a fixed duty could not with justice or prudence be maintained when corn had risen to the scarcity price." He proceeds with similar objections to a sliding scale of duties; insisting that nothing but an entirely free trade in corn and everything else can restore this country to its wonted prosperity. He asserts that the other European nations are lighter taxed, and their labourers and operatives *cheaper* fed than are the same classes in England; and, consequently, their manufactured goods are cheaper than the same articles manufactured in this country. All this is perfectly true; but how are such matters to be equalized? Mr. B. has a remedy at hand—namely, to reduce the price of wheaten bread to the continental standard, and by abolishing all duties on imported provisions. He is not candid enough, however, to speak of the kinds and qualities of the food used by the generality of the continental labourers: nor does he prove that the Yorkshire operatives

would be perfectly satisfied with the rye bread, weak wine, fruit, and soup-maigre, with which the Lyonese weavers are kept alive. Were Yorkshire weavers condemned to live upon the miserable fare used by operatives in the south of France, there would be no more complaint of the dearness of wheaten bread or Yorkshire pudding than there is among the labourers of Scotland or Ireland, who but seldom taste either one or other.

Mr. B.'s remarks relative to the special taxes chargeable upon land, and on account of which some measure of protection is considered to be due, are for the most part very reasonable and just, if they were not in some degree injured by carping collateral insinuations. He first shows that land in England is less taxed than that of any other country; and, though he admits that both land-tax and tithes are special burdens, he thinks that as they are *immemorial* charges, they can be no burden at all! Besides, he says, that farmers are exempted from certain taxes which others of the community are liable to; and on such particulars he brings a heavy charge against our legislators of past, as well as present times; inasmuch, as they have unfairly taken care of their tenants, as well as themselves, while imposing public burdens. He dwells on the increased rents and improvements of farming of late years; but is silent on the increased opulence of the master manufacturers, realized during the same period; and seems to think that the former should voluntarily lower the rents for the relief of the famishing operatives of the latter. But on all such matters Mr. B. is by no means a faithful commentator. He looks only on one side; and, notwithstanding the justice of his remarks on the opinions of Lord John Russell, they are only those of a decided adherent to the principle of free trade; and which he is confident would be of incalculable benefit to this country; for, though it would certainly ruin some branches of British manufactures, and which Mr. B. must be well aware of, he does not think proper to notice anything of this complexion. He takes for granted, that all other nations would readily reciprocate with us; but of this there are serious doubts.

But Mr. B. appears to be most anxious about opening our ports and markets to corn of foreign growth. On this all his hopes of bettering the condition of the poor, reviving trade, reducing the price of labour to the continental rates, lowering the rent of land, together with the establishments of the aristocracy, &c., &c.; all which he thinks would be the result of a repeal of the corn-law. Mr. B. is undoubtedly too sanguine in his expectations as to the results of the change he contemplates; for, under the present circumstances of British and foreign agri-

culture, no very material change would be perceptible for a year or two, even if the corn-law were repealed forthwith. But a certain consequence would be the giving such an impulse to continental and American farming, that corn of British growth, notwithstanding its superiority, would soon cease to be a remunerating production: hence there would be a great sacrifice of agricultural capital, and a general derangement of existing contracts relative to the tenancy and liabilities of landed property; causing serious loss and much annoyance to numerous parties. It is probable that Mr. B. foresees all this; but it is no part of his concern, as he very likely fancies that a general equalization would sooner or later take place, bringing all things, national and international, round again into a moderate and healthy state. This, however, would be a retrograde movement: the wages of our operatives must be reduced to those of the continent, and their diet accordingly, either in kind or quantity, and the credit and profits of British husbandry would be transferred to other lands.

However pertinent his remarks may be in reference to the opinions of Lord John Russell, they are not so interesting to the reader seeking information on this all engrossing subject. There are many proofs of his statements wanting, and many particulars omitted. He proves clearly enough that the duty on imported corn enhances its price to the consumer, and particularly in respect to bread. Here he ought to have shown how far the duty enters into the price of a 4lb. loaf. He should have shown also how far rent enters into the same; but he omits both these interesting questions. Mr. B. states that if our labourers had bread made of foreign corn, they would be contented with lower, or half-time wages; but he gives no statement to show the price of the untaxed wheat, the cost of its manufacture into bread in this country, nor its price per 4lb. loaf, or flour in the retailer's shop. The cost of manufacturing wheat into flour or bread cuts deeply into the price of the loaf; for in the case of foreign wheat there is the corn merchant, his factor and assistants, the miller and his vast establishments of men and horses, and, lastly, the baker and his retailers: all must have their respective profits withdrawn intermediately between the producer and consumer. The same charges, except freight and duty, are borne, and the same intermediate profits derived from home-grown bread-corn, to which must be added the British rent, tithe, cost and risk of production, &c.; all of which, when calculated and compared with the foreign article, will show that there is not so much difference in favour of the latter, on behalf of the consumer, as Mr. B. seems to imagine. But, at any rate, if that gen-

tleman really wished to make out a clear case of oppression against the government, he should have stated all these matters in detail, so that strangers to such a complicated subject should not have been bewildered by his general assertions.

Another thing was incumbent upon Mr. B. as a statistician, to have taken into consideration, and that is, the vast amount of taxation levied upon articles of which the land is the source. Malt, hops, and the inferior species of grain, are all of immense importance in the estimation of the chancellor of the exchequer. Mr. B. asserts that the cost of production and taxation is also paid by the consumer. Granted : but can the maltster, the brewer, and distiller, afford to pay the farmer as much for his barley as if no tax was laid upon the goods ? Or is it not more than probable that these middle men first calculate and provide for all their outgoings before they can determine what they shall allow the farmer for his barley. For, as to the latter demanding and obtaining what his barley costs him, is totally ridiculous in treating with such capitalists. And surely no one can affirm that the farmer in growing barley has an equal share of the profits arising from it as the maltster, brewer, distiller, or even the publican who retails their beverages. If, then, our British fields be the source of so much private and, consequently, of public advantage, it becomes a most hazardous affair, in the present financial state of the country, to tamper with, or in any way cripple or derange those certain sources of domestic wealth which an unqualified repeal of the corn-laws would assuredly occasion.

One natural consequence of opening our markets to foreign corn and grain would not only be, as already observed, the bringing in of thousands of acres into wheat culture in the north of Europe ; but the price in the foreign markets, as well as the freight from thence, would be advanced materially ; so that the expectations of receiving cheap foreign wheat would not be realised. Of course, the poor operatives, who, from what they have been told by Mr. B. and others, expect a full supply of cheap bread will be sadly disappointed, even if the corn-law were repealed to-morrow. It has been said by one of the members of the League that the landlord receives *two-pence* out of every 4lb loaf ! an assertion that could only be made by the most silly ignorance and inveterate hostility.

Such representations defeat the objects which the League has in view ; and they are here alluded to merely to show that the members of the League, as well as the public at large, will certainly be disappointed in the amount of benefits expected from the abrogation of the corn-law.

But as there will be no peace until something of the kind is tried ; and

as there is reason in many of the arguments employed by the agitators, it is a pity, perhaps, that there are so many obstacles in the way of complying with the popular cry. As to how it may affect the interests of landlords the League cares not a rush; but how are tenants to be relieved from existing leases or agreements, should the repeal lower the price of corn much more than it is at present? Voluntary concession on the part of liberal landlords may do much; but no fluctuation in the market price of produce can free a tenant from his responsibilities.

M.

September, 1843.

AGRICULTURAL PROSPECTS.

We have on several occasions adverted to the promotion of the interests of agriculture by the diffusion of science, and more especially since the formation of the Royal Agricultural Society, have seized every opportunity "in season"—some, perhaps, would add, "and out of season"—to impress upon those who possess ample means, and have influence at command, the urgent necessity that exists to establish at least one educational farm or agricultural college wherein every principle of science might be brought to bear upon practice.

If agriculture have any real claim to be considered a science, then it behoves those who feel its importance, who assert it to be the foundation of the state, and its tower of strength, to prove, by practical arguments, too strong to admit of doubt or hesitation, that certain effects must result from the employment of adequate means.

Hitherto, no step of moment has been taken in England, though we learn that in Scotland there are movements which demonstrate the work to have begun. A paper, however, has been placed in my hands, which proves that some persons have been actively employed in the West of England; and as the object, if pursued in the spirit which ought to actuate all who profess to labour for the welfare of the community must be good, it appears a duty to disseminate through the channel of this Magazine some knowledge of an establishment which has been projected and the objects which it contemplated.

The report first appeared in July, in the *Wilts Independent*, which stated that—"A provisional committee has been formed comprising the names of noblemen and gentlemen of the highest character, who, eschewing all political differences, have united together to carry out an object from which much good may reasonably be expected. All these

gentlemen have either taken shares (many of them five each) or have given donations.

“**THE PLAN.**—It is proposed to found an AGRICULTURAL COLLEGE, or an EXAMPLE FARM, in some approved spot—convenient for the counties of Gloucester, Oxford, Wilts, and Berks; probably near Cirencester, which was supposed to be a favourable situation.

“The capital required would be £12,000, which they proposed to raise by 400 proprietary shares of £30 each, bearing interest; and each shareholder having the privilege of recommending a pupil. Holders of five shares to be governors. The capital to be applied to the erection of school buildings, improvement of the farm, purchase of stock, implements, &c.

“The whole control to be in the shareholders, and the management to devolve on the board of directors, elected at an annual meeting.

“**THE FARM.**—It is proposed to purchase or to rent a farm of from 400 to 600 acres. The neighbourhood of Cirencester will be preferred, on account of its central situation, its market, and the railway accommodation. The farm is intended to be laid out in the most convenient manner, and to be brought into the highest state of tillage.”

Such is the skeleton of the proposed establishment; and, so far as is the object contemplated, it must be laudable. That object is—the discovery and adoption of sound leading principles. Hitherto, *routine* has governed the operations of the farm; and the theory of learned men has assailed this routine, at the same time pointing out errors, and suggesting improvement, which practical agriculturists have either ridiculed, or viewed with a jealous eye. But there is an apparent oversight in the very commencement; for if, as we perceive, it is proposed to purchase a farm of—say as a medium, 500 acres, which, if it be brought into the highest condition, must imply good land to begin with—how far would the suggested capital of £12,000 go toward the purchase money?

But to pass this over, and some other conditions which would demand scrupulous attention, we will now recur to the preliminary paragraph of the report; which announces the titles and names of those gentlemen of the committee who are already shareholders or contributors. Among the latter we find the Earl of Radnor, as a donor of £150, and Mr. Pusey, M.P. for Berks, £50. Among the shareholders are the Marquis of Lansdowne, Earls Bathurst, Ducie, and Fitzhardinge, Lord Sudeley, the Hon. W. L. Bathurst, Sir J. Guise, Sir M. H. Beach, Mr. Scrope, M.P., Mr. Langton, M.P., Revs. T. Maurice and J. M. Prower, Mr. Gordon, Mr. Ricardo, Mr. Holford, Mr. Kingscote, Mr.

T. Arkell, and many of the most practical farmers of Wilts and Gloucester.

With such a beginning the writer anticipates little difficulty in raising a sufficient sum to carry out the proposed plan; and we now proceed in the details of the constitution of the college, so far as they appear to have been digested, numbering the heads.

1. "*Paid officers and assistants of the farm.*—A farmer, a married man, will be necessary, and high testimonials of character required. He will be expected to have skill and experience in the management of land, stock, labour, &c.; to be adapted to have the sole management of the pupils whilst employed in the farm labours; to possess such knowledge of the leading sciences applicable to agriculture, as shall enable him to carry into practice the lessons acquired in the college. Also, in addition, a few paid labourers will be selected, competent to set an example in farm work."

In this paragraph we discover the projected machinery of the operative department—the tillage and cultivation of the land. By introducing a farmer of practical skill, and of liberal mind, capable to discern and appreciate the importance of philosophical science, one of the greatest difficulties toward improved agriculture has been duly met. Davy and Liebig, both profound chemists, could suggest; but their suggestions were slighted, and even derided, as mere visionary schemes, because they were formed in, or, at least, believed to have emanated from the laboratory. Yet Davy had experimented in the field, and studied nature in her own operations. No man of candid spirit, who has carefully perused the life of the great chemist, but must feel and acknowledge the truth of the assertion. However, if success be destined to attend the establishment of an agricultural college, a man of thorough practical skill *must* preside; and we therefore offer our cordial approbation of this part of the proposed plan.

2. "*The college.*—It is proposed, on or near the farm to erect a building to accommodate the head master and his family, including the domestic servants, the tutors, and, in the first instance, 100 scholars. The greatest attention will be paid to order, economy, and health, in the planning of the building, and in all the arrangements for board and lodging.

3. "*PAID OFFICERS OF THE COLLEGE.*—A head master, also a married man, will be selected, who has a sufficient knowledge of chemistry and geology, or of two of the more important sciences, as well as a general acquaintance with the other subjects taught in the college. In addition,

it is probable that two tutors or professors will be requisite; one mathematical, who will teach all that relates to calculation, such as mensuration, book-keeping, mechanics, machinery, &c.; the other a naturalist, competent to teach what relates to the animal and vegetable kingdoms."

The only remarks which are claimed on the items contained under the above two heads, will refer to the knowledge of chemistry required of the first professor; for upon all the other points which include that sort of knowledge which is indispensable to every person who hopes to thrive by the exercise of real economy, no one can entertain a serious doubt.

Of the science of chemistry, we are quite certain that an industrious farmer,—“the man with a hundred eyes,”—or in the language of scripture—“the *wise* man, whose eyes are in his *head*”—who *observes*, rather than *works*, though, in the case of emergency, he is competent and ready to lend his hand to every duty of the farm,—such a man, we say, can find neither time nor leisure to analyze or correctly ascertain the combinations and products of nature. He therefore must confide in others who are qualified to explore the mysteries. But still, to enable him so to confide, his education must have instructed him in the laws of chemical action. Ignorance scoffs at what it cannot understand; but knowledge confers not only *power*, but also confidence. Hence, chemistry must form a branch of the proposed system of education.

Had Liebig taught no other truth than that of the importance of ascertaining the quality and amount of inorganic constituents by the investigation of vegetable ashes, he would have done the cause of agriculture great service. The professor, therefore, of philosophy, must be fully competent to perform and teach all the processes of analysis, and to render all their products clear and unambiguous. He should also be able to demonstrate the components of all soils, and to exhibit every one of them separately, and in a condition wherein by simple addition the sum total could be made to tally sufficiently with the weight of the gross original.

But abstractedly considered, the strictly *chemical* analysis of soils is perhaps far less important than many have imagined; and it moreover involves so many difficulties, that few, however grounded in principles, could undertake it while engaged in the arduous duties of extensive farming. It is therefore fortunate that, by processes almost purely mechanical, the chief components of a soil may be estimated with facility and tolerable accuracy. For instance, the degree of moisture and the

quantity of water which a soil can retain, even when apparently dry, may be ascertained by reducing a pound or any given weight to fine powder, and drying it at a heat greater than that of boiling water. The presence of iron may always be suspected; but if considerable, the earth will assume a brick-dust tint by exposure to a strong red heat, while the loss in weight will pretty nearly show the proportion of decomposable manuring substances which it contained.

Its texture is easily discovered by immersing any known weight of earth, previously dried in the sun, in a quantity of water; after standing a short time, and being briskly stirred, the fine particles which float are poured off, and the washing repeated, till little or no fine matter can be separated. The several washings are to be collected together, and allowed to deposit their impalpable sediment, which, being dried at a moderate heat, will indicate the weight of the clay, chalk, and fine silex contained in any known quantity of earth.

“Practice makes perfect,” and by the simple means of washing, any adroit man can satisfy himself of the relative proportions of his soil; for all the heavy residue which is not carried off by the washings must consist of coarse gravelly, or argillaceous sand; which, however it may affect the *texture* of the earth, has little connexion with its chief chemical constituents—clay or alumine, chalk, and iron.

So far our agency is purely mechanical; but if the presence of chalk (carbonate of lime) be doubtful, recourse must be had to one chemical test—namely, spirits of salt (muriatic acid), and if by letting fall one drop of this acid upon a small quantity of earth brought to the consistence of paste, with water, no hissing or frothiness is produced, it may be safely conjectured that the quantity of chalk is very insignificant; perhaps not one part in a hundred.

Chalk is essential to all good loam. If vegetable matter (as in peat-bogs) superabound, we possess no re-agent so effectual to reclaim the soil as lime, in the hot or caustic state in which it comes from the kiln.

Persons talk of the *sourness* of soil; but were *acidity* the vice of peats, and other land glutted with vegetable matter, *chalk* would neutralize and correct it. But this is not the fact, and therefore quicklime is the remedy required; as, by the strong attraction which it possesses for water, it decomposes the surplus vegetable matter, causing the elements of water (their oxygen and hydrogen) to combine, after depositing the other third element (carbon) in the form of black charcoal. Hence, lime is said to *burn*; but, in so doing, it becomes mild lime, or chalk, by combining with a definite quantity of carbonic acid. We

have only generalised, in thus alluding to the agency of lime and chalk ; but herein the utility of liming and chalking is explained ; and if ever a chemical establishment be formed, the pupils will become familiar with the principles above alluded to, and with many others now frequently spoken of, yet very little appreciated.

4. "*Pupils.*—It is expected that the bulk of the pupils will be the sons of the farmers of the district on whose account the institution is founded ; and it is confidently believed that few, if any, parents (or guardians) will neglect the high duty of providing the best education in their power for their sons—the only fortune that cannot be taken from them. As the college is not intended for teaching the rudiments of learning, no pupil will be admitted under 14 years of age, and who has not a knowledge of reading, writing, arithmetic, and grammar ; and if above 16 years he must produce testimonials that he is of moral habits. No pupil to remain longer than four years. The terms will not be above £30 a year ; half to be paid in advance.

5. "*Instruction and employment.*—Half the day each scholar will be under instruction in the schools. The different sciences that relate to agriculture will be taught by the best works on the subject, and by lectures ; in the course of which, experiments, with the aid of good apparatus, will be resorted to, and the pupils will participate in the manual part, so as to familiarize them to the analysis and study of soils, &c.

"The other half of the day will be employed on the farm in the works of husbandry, making and registering trials of implements, practical experiments, &c. ; also in a common or botanic garden ; so that half the pupils will be always in the school, and half on the farm, or garden ; and the whole be accompanied by such good precept, example, and regulations, as shall conduce, with God's blessing, to the formation of fixed religious and moral habits.

6. "*Religious instruction.*—The religious instruction of the pupils will be strictly scriptural and be conducted by a member of the established church ; and every possible arrangement will be made to meet the wishes of those parents who, not being members of that church, shall send their sons to this establishment."

The plan, so far, appears to have been comprehensively arranged, and if followed out to completion, will bring the question—"whether agriculture be a science or not," to issue. But, *does it proceed.* A month has elapsed, and we hear nothing more of it. The chief obstacles to advance will be found—first, in the uncertainty of a subscription fund equal to the charges of the undertaking ; and, second, to the almost certain want of unanimity in the management.

Were any body of directors capable of conducting an experimental college, with a farm of 500 acres attached, it would be, we conceive, the *Royal Agricultural Society of England*.

A numerous and influential body of members, comprising the highest nobility of the land, with funds constantly on the increase, what could it not effect? It seems lamentable that resources so noble should be devoted to an annual exhibition, and the awarding of a few prizes. Yet, with all the power which a society so constituted might bring to bear upon the undertaking, we doubt much whether an elementary college and farm could be formed and carried through to the effectuation of its object. Unanimity, singleness of eye, and absolute devotion to the cause and its success, are indispensibly required; therefore, we conclude that it must be assumed by government, and conducted by responsible and able officers; or by some powerful individual, possessing ample and available funds, and imbued with zeal equal to that of the great Lavoisier, whose princely fortune was devoted to chemical discovery, and to the improvement of agriculture. As to the amount of the proposed fund, we are ashamed of the figures—£12,000!—many a farmer employs a capital to that amount! Were fifty, nay eighty thousand pounds the sum required, what would it be to—what would it abstract from the fortune of some of our wealthy nobility? We have been told of the outlay of a sum amounting nearly to the highest of the above figures upon *a single suite* of apartments! How exalted would be the act, were an extensive land proprietor to devote a portion of his thousands of acres to the express purpose, and completely to endow the establishment by sacrificing to it a small—a very small portion of one of his retired millions.

Unity of object, and union of effort, we repeat it, would be the life and soul of the experiment—without these, all must go by the board—with them, a mine of discovery would assuredly be the result.

But, in order to obviate the very common and mischievous error of endeavouring to prove too much, we must be prepared to admit that no one establishment, however comprehensive its ability and machinery, can reduce the science of agriculture to absolute and fixed principles; for, so long as soils and climate differ, so long will there be corresponding anomalous products.

What is required in the infancy of the progress—and that one experimental farm can accomplish—is the discovery to what extent soil acts upon vegetation, and whether or not the application of certain known substances produces assured results. Take, for example, a plot of fresh

loam, and determine by rigid analysis its precise constituents. Crop it with any vegetable, by seed taken from plants whose inorganic principles are known, according to suggestion of Liebig; and note the growth of the plants at every stage. By a final examination of them when mature, it will be seen how far the crop has been locally affected in a given *simple* soil.

Manures of known character will be subsequently employed, and every product submitted to analysis, and thus step by step certain specific effects will be detected. It will be perceived by these trifling hints, that real science, profound analytic skill, and intuitive perception must be unceasingly exerted; and, therefore, that if our agricultural youth be ever destined to conduct a farm upon certain principles, it must be trained under the guidance of men qualified to instruct in the laboratory as well as the field. The writer of the prospectus has perceived this necessity, and hence has enumerated the duties of the pupils, under head 5. These duties, if mutually fulfilled, would set at rest the long agitated question, concerning the utility of chemistry to agriculture; and by showing to the world what may or may not be accomplished, would prove of great advantage, by establishing the value of scientific researches, or setting aside as valueless all future attempts to systematize the culture of the land.

At present all is routine; principles there are none; and every one follows the fashion of the locality in which he resides; even the great Coke, of Holkham, who, perhaps, affords the noblest example of improved cropping, could not be considered a scientific agriculturist. Lavoisier can alone be cited as a pioneer in the course, and he fell by the axe of the guillotine in the prime of life. What we require, then, is experiment on the broad scale, and if that succeed, example will be induced by emulation.

That some great cause of error and comparative failure exists, is evident; and will be shown by a short recital of what may be deemed one of many thousands of facts. Within two miles of the spot where this article is written, is now growing a crop of wheat, about an acre in extent. The soil is the common hazel loam of the district, upon chalk and gravel; and it has borne a wheat crop about every third year, for a very considerable period. Beans, turnips, oats, enter the rotation, but never potatoes; the proprietor (he is not a farmer) thinking that they distress his land more than any other crop whatsoever. This acre plot has generally produced above 5 quarters of wheat; and the last crop yielded 6 quarters, and brought £18. Now, here is no particular ability ex-

erted, and the available manure is not abundant; yet the average yield overtops far away the reported crops of farms in general, where we are told of $3\frac{1}{2}$ to $4\frac{1}{2}$ quarters per acre.

If so fine an acreable produce can be obtained by a common shop-keeper, why should the *farmer* fall short in *his* produce. We possess written evidence of what is effected by spade husbandry in a stony district in Wiltshire, and which proves that the yield has been, and is, doubled, and even trebled. But though these facts exist, we remain ignorant of causes; and, therefore, it is high time to investigate, by the employment of such energy and machinery as are adequate to effect whatever human ingenuity can devise.

True it is, the agriculturist has to contend with the vicissitudes of the seasons; but so has the chemist, the merchant, the mechanic: all are subject to contingencies; but science and industry have prevailed, and we trust the time is not far distant when landlord and occupier will perceive the wisdom of directing their efforts toward the one grand object of doubling the produce of the land.

Another week has passed, and silence still broods over the scheme, the announcement of which forms the subject of this article. Yet it was so promising, so replete with wisdom, that we should be loth to believe its propounders had cooled in their endeavours. Be this as it may, so important is the object, that we have determined to extend the knowledge of what has been proposed, and thus, if possible, to arouse attention in quarters where power is at command.

The earnest, increasing solicitude that is evinced for the condition of the agriculturist, demands a serious trial of the only means which remains under the control of man to increase the product of the land. To the present period science has been cavilled at as useless, and mechanical agents almost exclusively are adopted. Thus, new and improved machinery has been constructed, and encouraged by prizes; drainage has been made the subject of reward, and of public lectures; but no individual, no body of men has devoted every energy to the promotion of scientific enquiry. We have met the question fairly and impartially. In extending the knowledge of the plan lately proposed in Wiltshire we have shown the difficulties which must attend its progress. Would that we could see the government active in promoting the grand enquiry; for, then, with power at command, the interest and welfare of the nation, which are deeply involved therein, could be adequately sustained by the national funds.

J. TOWERS.

August, 1843.

ISLE OF MAN AGRICULTURAL SHOW.

This exhibition took place on Thursday, the 10th of August, and was every way creditable to the society and to the island. The place selected for the show was chosen with great taste and good judgment. It was a little west of the town, at the place known as Scarlet, on that elevated, dry, beautiful ridge commencing near the shore, and extending north. No place on the island could have been more happily chosen. On the north, near at hand, the fields waved with grain, or the green-crop was in blossom, while the irregular undulating mountains in the distance formed a sublime back-ground. To the east lay the town in full view, with its time-hallowed castle, while a little to the right the college edifice presented its imposing front. On the south was a bay, and the sublime and awful sea, while to the west the fields smiled with the promise of a luxurious harvest.

We have witnessed many agricultural shows in various countries, many of which were brought out on a much broader scale than this; yet we do not recollect to have been better pleased than at Castletown. When it is considered that the people have but recently turned their attention to the cultivation of stock; that the society is yet in its infancy; that comparatively few farmers have the means to experiment and to make improvements, we think the show on this occasion was more than respectable, and does high credit to the enterprising competitors.

The number of animals exhibited was about 170; those regularly entered for prizes, 150. Many of the horned cattle showed high and improved blood, and some of the sheep were excellent. Of the horses we can say but little; they were coarse strong animals, and probably adapted to the labour of the island. One thing in regard to the horned cattle we noted with great pleasure, viz., that in the *young and rising generation* a marked improvement upon the older class was obvious; so that in a few years we may safely anticipate a high degree of perfection on this island.

The attendance was not quite so numerous as the day and occasion might warrant; yet the *élite* and highly respectable of the island were there.

The judges were four gentlemen from England, viz.—William Ellison, Esq., of Sizergh Castle, near Kendal; William Dickenson, Esq., of North Mosses, near St. Bees, Cumberland; R. C. Lowndes, Esq., of Mount Vernon, and George Martin, Esq., of Kensington, both near Liverpool.

They bestowed the utmost attention upon the business for which they were chosen, sparing no pains in their examination of every animal en-

tered; and in general their judgment was approved by the opinion of the people present. They commenced their labours early in the morning, and were not through till 4 o'clock. The following is a list of

THE AWARDS.

CLASS 1. Short-horned bulls.—1. Edward Faulder, Esq., 6 years and 6 months; bred by Mr. L. Sivens. 2. The President, 2 years and 8 months; bred by Mr. E. H. Strickland; highly commended.

Short-horned bulls, not exceeding 2 years.—1. Edward Faulder, Esq., 1 year and 3 months; bred by W. B. Jefferson, Esq. 2. The President, 1 year and 10 months; bred by himself.

Short-horned cows, in calf or milk.—1. W. B. Jefferson, Esq., white cows in milk; 4 years and 4 months. 2. V. P. Spittal (Daisy), 10 years.

Three-year old heifers, short-horns, in calf or milk.—1. Edward Faulder, Esq., 3 years and 6 months; bred by himself. 2. V. P. Spittal (in milk), 3 years and 3 months; bred by himself.

Two, and under three years old short-horn heifers.—1. V. P. Spittal, (Lilly) 2 years and 9 months; bred by himself. 2. Edward Faulder, Esq., 2 years and 5 months; bred by himself.

One, and under two years old short-horned heifers.—1. W. B. Jefferson, Esq., 1 year and 8 months; bred by himself. 2. Ditto, 1 year and 9 months.

CLASS 2. Bulls of any other breed.—1. The President (Devonshire) 2 years and 10 months; bred by Thomas Umbers, Esq. 2. James Alston, Esq., (Ayrshire) 3 years and 6 months; bred by Mr. G. Jack.

Cows of any other breed.—1. E. Faulder, Esq., (cross between short-horn and Devonshire); bred by himself. 2. E. Faulder, Esq., (cross between short-horn and Highland), 4 years and 6 months; bred by himself.

CLASS 3. Entire horses for farming purposes.—1. E. Faulder, Esq., (Governor) 3 years and 5 months; bred by himself. 2. Mr. W. Bridson, (George) 6 years and 6 months; bred by himself.

Brood mares for farming purposes.—1. George Quayle, Esq., 14 years and 6 months. 2. The President, (Clydesdale breed) 9 years and 3 months; bred by the late E. Gawne, Esq.

Three years old colts or fillies.—1. Mr. James Miller, 3 years and 5 months; bred by himself.

Two years old colts or fillies.—1. Mr. J. T. Cannell, 2 years and 6 months; bred by himself.

CLASS 4. Leicester rams.—1. E. Faulder, Esq., 3 years. 2. J. Corlett, jun., Esq., 2 years and 6 months; bred by Mr. Marshall.

Leicester ewes.—1. Henry Faulder, Esq., 1 year and 6 months and 4 years and 6 months; bred by himself.

CLASS 5. Cheviot ewes.—1. John Blyth, Esq., no age given. 2. His Excellency Lieutenant Governor Ready, 3 years and 6 months; bred by himself.

CLASS 6. Manx mountain rams.—1. Wm. Teare, Esq., 5 years; bred by Mr. Geo. Quayle. 2. J. Corlett, jun., Esq., 2 years and 7 months; bred by Mr. Jas. Allen.

Manx mountain ewes.—1. Mr. W. Quayle, 4 years and 6 months; bred by himself. 2. V. P. Spittal, no age given; bred by himself.

CLASS 7. Rams of any other breed.—1. The President, (Southdown) 2 years and 7 months; bred by — Bernard, Esq., M.P. 2. Captain Hay (Southdown) 1 year and 9 months; bred by himself.

Ewes of any other breed.—1. Captain Hay (Southdown) 3 years and 6 months; bred by Mr. Scotsmon. 2. V. P. Spittal, (Southdown) no age given.

CLASS 8. Boars of any breed.—1. The President (Irish) 2 years; bred by the Marquis of Waterford. 2. The President, (Berkshire) 2 years and 7 months; bred by Mr. Edward Bowley, of Gloucester.

CLASS 9. Sows of any breed.—1. Henry Faulder, Esq., no age given. 2. V. P. Hatton, (fed on grass alone for the last three months) 2 years and 7 months.

EXTRA STOCK.—1. W. B. Jefferson, Esq., black brood mare, Manx breed. 2. Henry Faulder, Esq., gelding, 6 years and 3 months.

Besides the above list, we must not forget to mention, what might not have been noticed by all present, a very beautiful lot of black cattle belonging to the president. These were not brought into the inclosure, but were hid away back of the building in another yard. Here were 16 fine young healthy black cattle, which would do honour to any country. They need not be hid; and in our humble opinion they will be found a breed better adapted to this climate than the more tender short-horned breed.

In this self-same yard was exhibited, on the occasion, a fine specimen of agricultural implements. They were brought from England by Mr. Martin, of Kensington, near Liverpool. There was about a dozen different implements—some for moving the soil, dressing crops, and destroying weeds; some for cutting straw, grinding peas and beans; others again for sowing turnips, drilling, &c., &c. One circular knife straw-cutter struck our fancy as a fine invention, and well adapted to the purpose. By the bye, *en passant*, cut straw, with ground oats, is the true feed for horses, which is quite too much neglected on this island.

THE DINNER.

The number present at dinner was 120. The president of the society, E. M. Gawne, Esq., presided as chairman, G. A. Wood, Esq., as vice-chairman.

The usual loyal toasts having been given, "Success to the Isle of Man Agricultural Society" was proposed.

T. A. Corlett, Esq., rose and said, that agriculture was identified with the well-being of this island; that they must go hand in hand, and rise or fall together. The Isle of Man is distinguished over most countries of the earth. True, it is not so large in territory, or equal in abounding wealth; yet it is distinguished for its peace, its exemption from political commotions and warlike ruptures, which more or less prevail in all surrounding countries. Thus situated, it could pursue its interests without distraction, and agriculture was its true interest. The

gentleman went on to say, many raise objections against this society, and say it is only good for the rich—that poor men cannot compete with the wealthy, and therefore the society cannot benefit the poor. Mr. C. refuted that notion, by showing its general tendency to introduce improvements into the country, by which the small farmer was benefited as well as the rich. The gentleman closed his speech by wishing “A long life and happy one to the president, and prosperity to the society.”

This was duly acknowledged by the chairman.

“The vice-chairman.”

This was responded to by G. A. Wood, Esq., of Balladoole, one of the vice-presidents of the society, and vice-chairman on this occasion. The speech was a very neat, classical, and appropriate one. We regret our want of space to embody it. We learned, in the course of the speech, that the vice-chairman belonged to a very old family on the island; that he was now, and had been for a year past, in ill health; that in the course of his time he had witnessed important changes coming over the island; that but 20 years ago, weeds and briars deformed much of the land that was now under high cultivation; that herrings and potatoes were then the only sustenance, where now the luxuries and refinements of life could be found. And that for these most important changes the country was much indebted to the agricultural society.

“The judges of the show, and the stewards of the yard.”

Mr. Ellison, one of the judges, responded to this toast at great length, but we have no room for his speech. He showed himself a pretty keen observer of horned cattle, detecting one here belonging to the president, which he alleged he had seen at a show in Derby. It turned out so: the fine young bull which drew the second prize here was exhibited at Derby; and the old farmer on seeing it, pronounced it to be the *ghost* of the Derby bull. The judges pronounced the show of cattle here highly creditable to the island, being equal to the best shows of England, after taking out those which drew the first prizes there. He encouraged the people here to improve their stock, assuring them that by so doing, both landlord and tenants would thrive by it. That by improvement of stocks, 25 per cent could be added to the amount of animal food for the country. And, indeed, if they would go to work, improve their farms and stocks as they might, they need fear nothing that other countries might do by way of competition; our good articles would command the markets, and we might set the world at defiance.

“The ladies” was responded to by James Aspinall, Esq., who, in consideration of his mother having been born in the island, and he thus

connected with the island's interests, proposed to give a premium of £5 to the person who should produce from his own raising the best two-year old heifer at the agricultural show in 1844.

The Hon. Deemster Heywood, now occupied the meeting with a speech, which we give in substance thus :—

Mr. chairman, I had intended to have availed myself of an earlier occasion to express my sentiments to the society, over which I have the honour to be one of its vice-presidents ; but the fault is not mine. I was detained from your first meeting by illness, and from your second by being absent from the island. Late as it is, I now feel great pleasure in meeting with you for the first time, and conveying to you my sense of the value of this society. I have attended various agricultural shows in England, and have witnessed the progressive improvements made in them. One in particular, the show of a single individual landholder, Mr.*****. I do not know that any one but Mr. Hinds and myself ever witnessed it. He is the proprietor of 20,000 acres, all embraced in a surrounding wall. I saw 300 or 400 of his tenants assembled together as an agricultural society, met by the landlord, to compete for the prizes which he in his well-judged munificence had held out to them ; and the effect of this novel exhibition was a healthy emulation, by which their stocks and their productions were much improved. For one, I was greatly struck with what one of the judges just delivered to us. I liked it because it was straightforward, *John Bullish*, and to the point. It was just one of those speeches most useful to us. It told us of our defects, and how we might amend them. We are a young society, still in our infancy ; we have much to improve. Let us not fancy that we have arrived at perfection, and thereby reject faithful, honest suggestions for our improvement. It strikes me we are most defective in our breed of horses. Now I am very partial to a good horse ; and it seems to me we have very few good horses here. Farmers would find their account in raising good horses. The expense is just as much to raise a poor horse as to raise a good one ; and it is just as easy to raise a good one as a poor one, if we had the proper stock. And allow me to appeal to my friend, the chairman here to my left, in behalf of his country, in connection with that subject. He has the means, the heart, and the disposition ; he only needs a hint to induce him to obtain a horse of first-rate blood, and thereby disseminate the breed, and improve the stock among his neighbours. In regard to horned cattle, though I am not much of a farmer, I think that the short-horned breed, however excellent they may

be in their kind, will not do here. We must have stock adapted to our climate. A hardier kind of cattle, I think, would be better for this island. Mr. chairman, before I sit down allow me to propose "The good health of James Aspinall, Esq.," who has so liberally offered a premium for the improvement of our stock.

This toast being drunk, and a proper response given, the company separated at an early hour.

And now, as we made no speech there, allow us in closing this account, to suggest a few things which may not be deemed out of place. No institution will benefit a community until that community can be won over to embrace the institution. There was more truth than poetry in the suggestions made by T. A. Corlett, Esq., where he said the common farmers regarded this society as a thing for the rich rather than for themselves. Their sentiment is so; and it becomes a serious inquiry with the managers of this institution how they can disabuse their minds of that impression. Where prizes are awarded to the best stock only, it is true, the small farmer has no chance. Money will command that superior stock from abroad which the common farmer cannot aspire to; hence he gives over in despair, abandons the trial, and with it the society altogether. Allow us to suggest. 1. Improved farms should become subjects of rivalry and entitled to prizes. 2. The quantity of corn or other crop raised on an acre should come in for prize or premium. 3. No animal which has taken a prize in one class, should ever be allowed to take another prize in the same class. 4. And above all, a system should be devised to operate upon the local prejudices, and diffuse light connected with agriculture. What say for some of the well informed members in the society, to call meetings from time to time in the school houses of the respective parishes, to talk over all they have learned of farming, with the common farmers of the parish? In this way prejudices could be removed, and an interest created in a thing, which they regard as beyond their reach, or alien to their prosperity. By a residence of several years in the rural districts of this island, we have read the character of the commonalty, and think there is weight in the above suggestions. If a general interest can be begotten in behalf of this excellent institution, it will operate a change in the condition and prospects of Manksmen, which will tell upon the present and coming generations.

MEETING OF THE ROYAL AGRICULTURAL SOCIETY OF
IRELAND AT BELFAST.

The second anniversary of this important association was celebrated at the above-named town on Wednesday, the 30th of August. We are indebted to the kindness of the Proprietor of the Northern Whig for the particulars, which appeared in an extra number, got out expressly for giving immediate publicity to the transactions of the society, although no arrangements were made by that body for facilitating the exertions of the reporters.

A tract of ground, situated in the rear of May's Market, of about three acres in extent, was judiciously and securely enclosed and partitioned off, for the exhibition of horses, black cattle, sheep, swine, &c. The market square was appropriated to the farming implements; and the long covered building in the centre was laid out with tables for the exhibition of grain, grasses, butter, damasks, lawns, sewed work, &c.

At ten o'clock on Thursday, the show-yard was opened, and was, of course, the centre of attraction. The stock brought forward for competition fully realized our expectations. From the herds of England, Scotland, and Ireland, the choicest animals have been presented; and though not so numerous as the entries warranted, on no occasion in any country, has there been so large a collection of stock exhibited so nearly approximating to perfection. It must, however, be an unpleasant reflection to those interested in the agricultural improvement of Ireland, to notice *the low position which Irish cattle occupied*. But we trust that this meeting has infused a proper spirit of emulation into the Irish breeders of stock, so as to prepare them for general competition hereafter.

The agricultural implements exhibited were very numerous; and the principle and style of workmanship reflect great credit upon the parties concerned. It is highly gratifying to observe, that in this department there has not been any lack of Irish talent in competing with their powerful neighbours.

The samples of grain exhibited were generally choice of their kinds, and were much admired. The grasses were judiciously selected and well arranged; and in general farming seeds the exhibition was excellent.

Although it is not possible for us to give the entire speeches at the dinners, we take the following by Lord Erne and Mr. Bullen the secretary, as giving particulars of the progress of the society which must

gratify every friend of agriculture. On the toast of "The Royal Agricultural Improvement Society of Ireland" being proposed—

Lord Erne rose and said,—My Lord Duke, having the honour to be one of the vice-presidents of the Royal Agricultural Society, I rise on its part to return thanks for the flattering manner in which you have proposed the toast; and to you also, my lords and gentlemen, for the enthusiastic manner in which you responded to the call just now made to you by the noble chairman; and I trust that your cheers will not die away within these walls, but will reverberate through Ireland, and be the means of arousing the drooping spirits of our agricultural friends, wherever they be. I rejoice to say this society has been prosperous, even beyond our most sanguine expectations, and I trust that it ever will be so; for in my heart I believe that there is no one society in Ireland which is more required, or will be found more useful, than the Royal Agricultural Society. I do believe there is no country in the world, upon which Providence has bestowed more blessings, such as to render it an agricultural country; but I grieve to say we have not turned those blessings to the best account. There is no country where, until lately, the farmers were more ignorant of the common rudiments of farming; but I hope that this society will be the means of instructing them, as it has already commenced doing: for I think we can all see an evident and great improvement in many parts of the country; and I hope that, in a little time, we shall not be behindhand any other. This society will also effect another good work, by bringing landlord and tenant together, and making them become better acquainted; for I feel quite certain, the more they know of each other, the better they will like each other; and they will soon see that their interests are inseparable, and that we are neither the cruel nor tyrannical race that we are falsely represented to be. This society will also bring the poor man and the rich man together upon pleasant terms, and last, though not least, men of all parties and politics will meet together for one great and good object—that of benefiting their country and their fellow creatures. Happy would it have been for Ireland if those great assemblages of which we have heard so much of late had been to obtain agricultural instruction; but I trust that better times are in store for Ireland, and that Irishmen will at last find out who are their real friends, and who wish to benefit them most. I feel proud and happy to be called upon to return thanks for this society; for I have always looked upon it in the light of a child; having stood sponsor for it, with your grace and Mr. Purcell; and I hope we have done our duty in nurturing it during its tender years.

Now, since it has arrived at years of maturity, I think it will be able to take care of itself. Yes, I am happy to say, it has taken care of itself; for, by the good name it has earned for itself, it has already accumulated in the funds a capital of £4000, and an income of £2000 a year, well paid. This, for a young one, is doing pretty well. It has also been most prolific, for it has already above one hundred young societies. I, therefore, do trust and hope, that the gentry of Ireland will all come forward, and support this favoured child. They may rest assured it is their duty; they may rest assured it is their interest; therefore, to make use of a good old northern phrase, let us have "a long pull, a strong pull, and a pull altogether." His lordship concluded by calling on the secretary to read the premium sheet.

Mr. Edward Bullen, the secretary, then proceeded to read the award of premiums which were given at the show that day. He said, that, before he would do so, he felt it his duty to state a few leading facts connected with the proceedings of the society, but more particularly with that department of it which did not come so conspicuously before the public as what they had just witnessed, namely, the local farming societies of Ireland. When the central society was first formed, in 1841, there were only twenty-three of these valuable institutions in connexion with it; in 1842, the number had increased to fifty; this year, they gave premiums to eighty of them, and twenty had been since added, making a total of no less than one hundred of these useful and valuable institutions then at full work, and all cordially and practically connected with the central body. Their noble vice-president had told them that their annual income had amounted to upwards of £2000, and this they applied in the following manner:—They gave premiums at the large cattle shows to the amount of about £900, for improving the breed of stock, and introducing the prime and more valuable breeds into this country. They also gave considerable sums for the improvement of flax, yarn, butter, agricultural implements, &c.; and the result of that day's meeting had shown tolerably well with what success their efforts had been previously attended. It was, however, through the silent and less obtrusive machinery of the local farming societies, that the council hoped to carry out their views, and, for this purpose, they allocated a sum of over £1000, being the whole amount of their annual subscriptions, to be given exclusively to small working farmers, under 25 Irish acres, to encourage and instruct them in husbandry. This was what the society considered its most important feature, as its annual meetings and cattle shows were only considered necessary for the pur-

pose of introducing the stock, and giving proper publicity to its proceedings. Next year he hoped that increased funds would enable them to extend the sphere of their utility. In reading out the award of premiums, the secretary commented at considerable length upon the effects already produced by the premiums given for butter and for flour. They tried the experiment for butter in Cork last year, by giving premiums for the London and the foreign market; and such a competition had been created, as would, if properly followed up, beat the Dutchman out of the field entirely. As to the flax prizes, the great extent of competition, and the eagerness with which the different parties contended, was evidence of the effect produced by even the limited means that had been allocated for that purpose. He felt it necessary to state these few facts, as many erroneous ideas existed as to the real objects and machinery of the society; for some persons thought it was confined to a great cattle show like the present, and nothing else. Mr. Bullen then concluded a long and elaborate statement, by saying that the funds and members of the society were increasing every day, and that they had received a vast accession to their numbers, particularly since they had announced that it was their intention to hold their meeting in Belfast, and concluded by reading the following

LIST OF PREMIUMS.

CLASS A.—SHORT-HORNED BULLS.

Bulls calved after 1st January, 1839, and previous to the 1st January, 1841—20 sovereigns. First premium, gold medal, silver medal, 20 sovereigns, and the Halvestown cup, value 100 guineas, to Mr. David Hill, Edenhall, Penrith, for his Durham bull Eden, 4 years old.

Two-year old bulls, calved after 1st January, 1841, 10 sovereigns.—To Mr. John Unthank, Netherscales, Penrith, for his Durham bull, 2 years old.

Yearling bulls, calved after 1st January, 1842, 10 sovereigns.—To Mr. A. H. C. Pollock, Mountainstown, Navan, for his Durham yearling bull Vandyke.

CLASS B.—AYRSHIRE BULLS.

Bulls calved after 1st January, 1839, and previous to 1st January, 1841, 20 sovereigns.—First premium and medal to Mr. Robert Kirkwood, High Long Muir, Kilmaurs, for his Ayrshire bull Sandy, 4 years old.

Two-year old bulls, calved after 1st January, 1841, 10 sovereigns.—To Mr. John Baird, High-Cross, Glasgow, for his Ayrshire bull, 2 years old.

Yearling bulls, calved after the 1st January, 1842, 10 sovereigns.—To Mr. James Fulton, Jamestown, Maybole, for his Ayrshire yearling bull.

CLASS C.—DEVONS.

Bulls, calved after the 1st January, 1839, and previous to the 1st January, 1841, 20 sovereigns.—To Mr. Robert Thompson, Brandrin, Monaghan, for his Devon bull Creighton, 3 years old.

Two-year old bulls, calved after 1st January, 1841, 10 sovereigns.—To Lieutenant-General Lord Lynedock, Perth, for his Devon bull Sukie, 2 years old.

CLASS D.—ANY DISTINCT BREED NOT SPECIFIED IN THE ABOVE SECTIONS.

Bulls, calved after 1st January, 1839, and previous to 1st January, 1841, 20 sovereigns.—First premium and medal to Mr. Hugh Kellor Watson, Meigle, N.B., for his Angus or Forfarshire bull Jock, 4 years and 6 months old.

Yearling bulls, calved after 1st January, 1842, 10 sovereigns.—To the Rev. William B. Forde, Seaforde House, Seaforde, for his long-horned Leicester yearling bull Princepts.

CLASS E.—WEST HIGHLAND AND KERRY BREEDS.

Bulls, not more than 4 years old, 10 sovereigns.—To Mr. David Charles La Touche, Marlay, Dublin, for his West Highland bull, 2 years old.

Cows, in calf or in milk, 5 sovereigns.—To Mr. David Kerr, Montalto, Ballinahinch, for his West Highland cow, in calf, 3 years old.

Heifers of any age, 5 sovereigns.—To Mr. Thomas Henry, Downpatrick, for his West Highland heifer, from the island of Skye, 4 years old.

CLASS F.—COWS AND HEIFERS, ANY BREED.

Cows, in calf or in milk, 10 sovereigns.—First premium and gold medal to Mr. John Forrest, Stretton, Cheshire, near Warrington, for his Durham cow Victoria, 3 years old. Second premium to Mr. John Forrest, for his Durham cow Bella, 7 years old.

Heifers in calf, or cows in milk, calved after the 1st January, 1840, 5 sovereigns.—To Mr. John Forrest, for his Durham heifer, Bonny Face, 3 years old.

Two-year old heifers, calved after the 1st January, 1841.—First premium to Mr. Gabriel Dunlop, Peacock Bank, Stewarton, for his three Ayrshire heifers, 2 years and 4 months old.

Two-year old heifers, calved after the 1st January, 1841.—First premium to Mr. John Kane, Turf Lodge, Belfast, for his Durham yearling heifer Nanny, got by Mr. Langtreys bull.

CLASS F. No. 2.—AYRSHIRE COWS AND HEIFERS.

Cows in calf or in milk, 10 sovereigns.—To Mr. Alexander Buchanan, Burnkirk, Glasgow, for his Ayrshire cow, 4 years old. Second premium to Mr. Thomas Ross, Queensburne, Kilsythe, for his two Ayrshire cows, 3 and 4 years old.

Heifers in calf or cows in milk, calved after 1st January, 1840, 5 sovereigns.—To Mr. Gabriel Dunlop, Peacock Bank, Stewarton, for his two Ayrshire heifers, 3 years and 4 months old.

Two-year old heifers, calved after 1st January, 1841, 5 sovereigns.—To Mr. John Anderson, Shuttleston, Glasgow, for his Ayrshire heifer, 2 years old.

Yearling heifers, calved after 1st January, 1842, 5 sovereigns.—To Mr. Gabriel Dunlop, Peacock Bank, Stewarton, for his three Ayrshire yearling heifers.

CLASS G.—SHORT-HORNED COWS, HEIFERS, AND OXEN.

Cows, in calf or in milk, 10 sovereigns.—First premium and medal to Sir Robert Bateson, Bart., Belvoir, Belfast, for his Durham cow Countess, 7 years old. Second premium to Mr. Roger Magennis, Ballyely, Dromore, for his Durham cow Beauty, 8 years old.

Heifers in calf or cows in milk, calved after 1st January, 1840, 5 sovereigns.—To Mr. Benjamin Williams, Mitchelstown, Finglas, for his Durham heifer, 2 years old.

Two-year old heifers, calved after 1st January, 1841, 5 sovereigns.—To Mr. Samuel Orr, Flowerfield, Coleraine, for his Durham heifer, 2 years old.

Yearling heifers, calved after 1st January, 1842.—First premium to Sir Robert Bateson, for his yearling heifer.

Oxen, calved after 1st January, 1840, 3 sovereigns.—To Mr. Malcolm M'Neil, Curran, Larne, for his Durham ox.

Fat Heifers, calved after 1st January, 1840, 3 sovereigns.—To Mr. John Christy, Stramore, Gilford, for his Durham heifers, 3 years old.

CLASS H.—AYRSHIRE COWS, HEIFERS, AND OXEN.

Cows, in calf or in milk, 10 sovereigns.—First premium and medal to Mr. Andrew Templeton, Ballyleidy, Holywood, for his Ayrshire cow, 6 years old. Second premium to Mr. Andrew Templeton, for his Ayrshire cow, 6 years old.

Heifers in calf or cows in milk, calved after the 1st January, 1840, 5 sovereigns.—To Mr. William Johnston, Templepatrick, for his Ayrshire heifer, three years old.

Two-year old heifers, calved after 1st January, 1841, 5 sovereigns.—To Lord Dufferin and Clanboye, for his Ayrshire heifer, 2 years old.

Yearling heifers, calved after 1st January, 1842, 5 sovereigns.—To Mr. William Johnston, Templepatrick, for his Ayrshire yearling heifer.

CLASS I.—DEVON COWS, HEIFERS, AND OXEN.

Cows in calf or in milk, 10 sovereigns.—First premium and medal to Mr. Robert Thompson, Brandria, Monaghan, for his Devon cow, 5 years old. Second premium to Mr. Hugh Barclay, Monaghan, for his Devon cow, 6 years old.

Heifers in calf or cows in milk, calved after 1st January, 1840, 5 sovereigns.—To Mr. Robert Thompson, for his Devon heifer.

Two-year old heifers, calved after 1st January, 1841, 5 sovereigns.—To Mr. Robert Thompson, for his Devon heifer, 1 year old.

Yearling heifers, calved after the 1st January, 1842, 5 sovereigns.—To Mr. Robert Thompson, for his three Devon yearling heifers.

Oxen, calved after 1st January, 1840, 3 sovereigns.—To Mr. A. C. Bradford, Cavanmore, Dundalk, for his Durham ox, 3 years old.

Fat heifers, calved after 1st January, 1840, 3 sovereigns.—To Mr. A. C. Bradford, for his Durham heifer, 3 years old.

CLASS K.—ANY BREED NOT INCLUDED IN THE ABOVE CLASSES.

Cows in calf or in milk, 10 sovereigns.—First premium and medal to Mr. Thomas Seymour, Ballymore Castle, Ballinasloe, for his polled Angus, 5 years old.

Heifers in calf or cows in milk, calved after 1st January, 1840, 5 sovereigns.—To Mr. Thomas Seymour, for his polled Angus heifer, 2 years old.

Two-year old heifers, calved after 1st January, 1841.—To Mr. John Christy, Stramore, Gilford, for his Hereford heifer, Venus, 2 years old.

Yearling heifers, calved after 1st January, 1842, 5 sovereigns.—To Mr. F. D. Finlay, Calendar-street, Belfast, for his cross-bred yearling heifer.

Oxen, calved after 1st January, 1840, 3 sovereigns.—To Mr. John Christy, for his Hereford ox, Sovereign, 3 years old.

CLASS U.—EXTRA STOCK.

Oxen.—First premium, £11, and medal, to Mr. Hugh Kellor Watson, Meigle, Scotland, for a 4-year and 5 months old Angus or Forfarshire ox. Second premium, £7, to Lord Viscount Powerscourt, Powerscourt, Enniskerry, for a four-year old short-horned ox.

Sheep.—First premium, £2, to Mr. William Hewer, Northleach, for a lot of seven improved Cotswold sheep, 18 months old.

Swine.—First premium, £2 10s., to Mr. Robert Nicholson, Stramore-house, Gilford, for a pair of pigs, 2 years old. Second premium, £2, to Earl Caledon, Caledon, for 2 fat pigs, 2 years old.

CLASS L.—HORSES.

Cart stallions, over 3 years old and not more than 7, 30 sovereigns.—To Mr. Alex. Galbraith, Croy, Cunningham, Stirling, for his Clydesdale stallion, Prince Albert, 7 years old.

Cart stallions, not more than 3 years old, 15 sovereigns.—Second premium to Mr. Lawrence Drew, Carmill Mills, Glasgow, for his Clydesdale cart stallion, Young Briton, 3 years old.

Thorough-bred stallions, the medal.—To Mr. John Martin, Inch, Downpatrick, for his thorough-bred stallion, Hillsborough.

Thorough-bred mares, in foal or with foals at foot, 10 sovereigns.—To Mr. John Martin, for his thorough-bred mare, Lady Charlotte, aged.

Cart mares, in foal, or having reared a foal in 1842.—To Mr. Alexander Murdock, Hiltown, Glasgow, for his Clydesdale mare Jeas, aged. Second premium to Mr. Alexander Anderson, Linlithgow, subject to provision of fulfilling the condition.

Two-year old cart colts or fillies, 5 sovereigns.—To Sir Percy Nugent, Bart., Donore, Mullingar, for his cart filly, Clydesdale and Cleveland cross, 2 years old.

One-year old cart colts or fillies, 5 sovereigns.—To Mr. Robert Craig, Buckley, Glasgow, for his Clydesdale filly, 1 year old.

For the best Spanish or foreign ass, 5 sovereigns.—To the Earl of Roden, Tollymore Park, for his Spanish ass The Knight of St. John, 4 years old.

CLASS M.—LEICESTER SHEEP.

For the best ram, 10 sovereigns.—To Mr. William Smith Burton, Northumberland, for two rams, 2 years old.

For the best shearling ram, 5 sovereigns.—Second premium to Sir Percy Nugent, Bart., Donore, Mullingar, for two rams.

CLASS N.—COTSWOLD SHEEP.

For the best ram, 10 sovereigns.—To Mr. Thomas Seymour, Ballymore Castle, Ballinasloe, for one ram.

Shearling rams, 5 sovereigns.—To Mr. Wm. Hewer, Northleach, for a lot of rams.

CLASS O.—SOUTHDOWNS.

Rams, 10 sovereigns.—First premium and medal to Mr. Jonas Webb, Church Farm, Babraham, Cambridge, for one ram, 3 years and 6 months old.

Shearling rams, 5 sovereigns.—To Mr. Jonas Webb, for three shearling rams, 1 year and 6 months old.

CLASS P.—ANY BREED NOT INCLUDED IN THE ABOVE CLASSES.

Rams, 10 sovereigns.—To Sir Percy Nugent, Bart., Donore, Mullingar, for one ram.

Pen of five shearling ewes, 5 sovereigns.—To Mr. David R. Ross, M.P., Rosstrevor, for five Cheviot ewes.

CLASS Q.—SWINE.

Boars of any age, over 18 months, 5 sovereigns.—To Mr. William Sherrard, Kilboggil, Cabinteely, for one boar.

Boars not exceeding 18 months old, 3 sovereigns.—To Mr. George Kane, Magilligan, Newtownhamavady, for one boar.

Breeding sows, 5 sovereigns.—To Mr. William Sherrard, for two sows. Second premium to Mr. G. Dunbar, Woburn, Donaghadee, for one breeding sow.

Three pigs of the same litter, not less than 9 months old.—To Mr. Walter Graham, Belfast, for three pigs.

CLASS S.—BUTTER.

Judges for butter.—Robert Rea, London; John Craft, London; William Dintott, Horsham, Sussex.

London market.—First premium and medal to Mr. Ezekiel D. Wylie, Templepatrick. Second ditto to Mr. William Fulton, Standing Stone. Third ditto to Mr. B. Brooke, Ballymoney.

Foreign market.—First premium and medal to Mr. Ezekiel D. Wylie. Second ditto to Mr. Joseph Barren, Templepatrick. Third ditto to Mr. John Archbold, Caramoney.

Mr. Skinner then read the following list of premiums offered for flax by the Royal Agricultural Society.

Flax, growth of 1843, sample scutched of 112 lbs., prize for quality.—First premium to Mr. James Henderson, county Derry. Second premium to Sir James Stronge, Tynan. Third premium to Mr. George Henry, Keady.

Best cleaned and handled flax, without reference to quality.—First premium to Mr. John M'Kee, Keady. Second premium to Mr. Frederick Shaw, Knockashaw, Keady. Third premium to Mr. Richard Walker, Tullygirvan.

By the Society for the Improvement of the Growth of Flax in Ireland. A stone of flax, as sample of not less than 30 stone of crop, 1842, stacked, held over, and from which seed has been saved, according to the Courtrai system.—First premium to Mr. M. Russell, jun., of Newry. Second premium to Mrs. Clarke, Newry. Third premium to James Murland, Esq., Castlewellan.

For the best bushel of seed, sample of not less than 50 bushels, of crop 1842, treated on the Courtrai system.—To J. B. Bankhead, Esq., Castlewellan.

Best bushel, sample of 50 stone, rippled in the ordinary way.—To Henry Haslett, (Flax Society's agriculturist), Newtownlemavady.

To the Irish or British agricultural labourer, who will exhibit a sample, not less than one stone, of best hand-scutched, best handled, and neatest put flax, without reference to quality.—To James Killen, labourer to J. B. Bankhead, Esq., Tullyquilly.

The Royal Society's premium for the best four hanks of yarn, spun on the ordinary spinning-wheel, to be of the fineness of twenty-five hanks to the lb., and upwards.—First prize £5, to Ellen M'Clement, Ballinagaskill. Second ditto £3, to Hannah M'Clement, ditto. Third ditto £2, to Grace M'Clement, ditto. These are three sisters, the daughters of a poor cottier, who resides upon the estate of George Macartney, Esq., of Lissanoure Castle.

For the best piece of linen cambric.—To Messrs. George M'Murray & Co., Waringstown.

Report of the Award of Premiums for Implements, Seeds, &c., at the Show of the Royal Agricultural Improvement Society, held at Belfast, August 30, 1843.

The judges in this class are gratified in being able to report that the exhibition of implements, seeds, &c., has on this occasion been much more extensive and interesting than that of last year at Cork, especially of the more useful implements, applicable to the agriculture of Ireland, and that a fair proportion, the production of native talent, has been brought forth. They would beg to recommend the following as deserving of especial notice, and of the several premiums specified, as under :—

For the most extensive and best executed general assortment of implements, manufactured by the exhibitor.—First premium to Messrs. M'Adam, Curell, and Co., of Belfast, the society's silver medal and £12. Second premium to Mr. Robert Law, of Shettleston, Glasgow, silver medal and £8.

For the best general assortment of collected implements.—First premium to Messrs. William Drummond and Son, Agricultural Museum, Stirling, silver medal and £10. Second premium to Mr. John Gwynne, of Bushmills Foundry, county Antrim, silver medal and £5.

For ingenious and useful implements, manufactured by the exhibitor.—To Mr. Andrew M'Kerron, of Beansburn, Kilmarnock, Ayrshire, silver medal and £5.

For ingenious improvements of particular implements.—To Mr. Robert Law, of Shettleston, Glasgow, for his malleable iron field roller, silver medal. To Messrs. M'Adam, Curell & Co., for improved means of adjustment of the following implements, viz.—plough muzzle, oat bruiser, and Finlayson's harrow, silver medal. To John

Wightman, of Ballymeglass, County Down, for a very complete and cheap double blast corn farmer, silver medal and £2. To David Harkes, of Knutsford, Cheshire, for his draining plough, which appears very suitable for alluvial clay land, but is not considered generally suitable to the soil of Ireland, silver medal and £2. To Robert Johnston, of Hillsborough, for a simple and strong cart, with moveable body, silver medal. To Robert Gray, of Kirkoswald, Ayrshire, for a well-executed improved potato raiser, silver medal and £2. To Messrs. William & John Neill, of Belfast, for a simple, complete, and cheap steaming apparatus, silver medal.

The judges would also beg to recommend a very simple steaming apparatus, exhibited by Messrs. Rowan & Sons, of the Doagh Foundry; but they fear, that, from the circumstance of the boiler being made of cast iron, accidents might arise, particularly as there is not a self-acting apparatus for regulating the feed of water.

To Mr. William Shaw Millar, of Broadisland, Ballycarry, for an improved churn, which appeared to the judges to do its work efficiently, with very little labour, and in an incredible short space of time, silver medal and £2. To Mr. J. D. Young, of Perth, for the exhibition of an extensive and complete assortment of iron fencing, silver medal and £5. To Messrs. W. & C. Young, of Edinburgh, for a very extensive and elegant assortment of iron fencing and ornamental wire-work, silver medal and £5. To Mr. Robert Thomson, of Jennymount, Belfast, for the introduction, into this country, of the Marquis of Tweeddale's drain tile machine, manufactured by James Hunt, London, silver medal. To Mr. Robert Boyle, of Ayr, for drain tiles of superior machine manufacture, and moderate price, (viz.—20s. per 1000), silver medal and £2. For the best general collection of grasses, varieties of wheat, agricultural seeds, &c., &c. First premium, silver medal, to Messrs. Scott, Brothers, of Belfast. Second premium, silver medal, to Messrs. Drummond & Sons, of Stirling.

There were also collections of seeds exhibited by Mr. Thomas Oliver, of Edinburgh; by Mr. David Roughhead, of Haddington; and Mr. Charles Howden, of Edinburgh; which the judges consider deserving of commendation.

The judges also beg to recommend to the notice of the public a turnip and manure drill, invented by Mr. Sidey, and exhibited by the Messrs. Drummond, of Stirling.

The judges, in making their award of premiums, have thought it best to give the society's medal, as being a more permanent mark of approbation, and as tending to promote that honourable emulation creditable to intelligent men. In giving money, they chiefly considered the extent of the exhibition, and the distance from which it has been brought, as incurring a greater expense to the exhibitor; and have had specially in view the encouragement to implement makers of the sister kingdom, to bring into Ireland improved implements.

JAMES SMITH, ROBT. COWEN, JOHN GEO. CODDINGTON, Judges.

P.S.—The model of Ainalie's tile-making machine, having been detained by accident in a steamer, arrived after this report had been made out. The judges, however, thought proper to admit it, and highly commended it as a useful machine. Requiring 5-horse power will cost, for the machine alone, £150; and will make 24,000 tiles per day. They award to the exhibitor, Mr. Sleight, of Edinburgh, the society's silver medal.

JAMES SMITH.

A public examination of the agricultural class of the Larne National Schools took place at the Music Hall. His grace the Duke of Leinster presided. The examination embraced an extent and variety of agricultural information which, considering the ages of the pupils, was quite re-

markable, and their answering elicited the most decided approbation from all present. Their perfect intelligence, as to the nature and composition of soils, the appropriate manures, the mode of culture, and, above all, the economical management of small farms, was all that could have been expected from experienced and scientific farmers. It was admitted by all who heard them, that the diffusion of such instruction amongst the peasantry was the one thing needful for Ireland, and more directly calculated to promote agricultural improvement than any other means that have yet been devised. In a word, the examination of these boys has fully realised the expectations which the promoters of the institution indulged in at its formation. We subjoin an extract from the prospectus which the managers published at the period of the establishment of the school; and we can safely aver that never was a prospectus more fairly carried out:—

“The committee hope to be able to combine with the useful education now given, another most important branch of instruction—namely, the practice and theory of an improved system of husbandry. This it is proposed to accomplish by connecting with the National Schools a small model farm, in which the principles of agriculture will be taught and exemplified, with special reference, however, to that system of tillage and management which, as experience has shown, may be successfully employed in the very smallest holdings, and the introduction of which among the small farmers of this country could not fail to effect an important change in their habits and condition. Differences of opinion may prevail, as to the benefits likely to arise from instructing those classes in other branches of knowledge; but none, it is presumed, can exist as to the paramount importance of giving them such lessons in industry, and the skilful management of their affairs, as are calculated to raise them from a condition verging on pauperism, to one of comparative comfort and independence—calculated, in a word, to render them a blessing, instead of a burden, to the community.”

English Flax.—The growth of flax, of which so much has hitherto been imported into this country from foreign states, has been greatly increased, and so successfully, it appears, in the present year, that the flax society in Norfolk have found it advisable to engage competent persons from Belgium to pull, tie, and shock it.

PROPOSALS FOR BETTERING THE CONDITION OF THE LABOURER.

SIR,

From publications in your Magazine, I infer that you are not indifferent to the interests of the agricultural labourer, therefore I beg to call your attention to a subject which I think has not sufficiently attracted the notice of those who would wish to meliorate the condition of the labourers in husbandry of this country. What I allude to is, the numerous enclosures of commons that of late years have taken place. Although it must be admitted that the produce from enclosed land is greater than from unenclosed, consequently there must be more to divide among the public, yet there is in common land what is favourable to the distribution of wealth, and advantages which do not exist when the land gets into the hands of individual proprietors. It is true, a man who has a small free or customary hold in a manor, receives a proportion of the new enclosure as his right; but there are others that derive advantages from unenclosed land, which, when it is enclosed, must be lost; and besides, the small portions, so distributed and apportioned, must frequently adjoin the large field of some one who will covet to make his field larger, and will possess it by making a sacrifice, and then it is out of the market as regards the man of small capital. The consequence that the small properties are added to the large is, probably, that the husbandman in this country of broad lands is often obliged to take his house from a building speculator, without a foot of land for a garden, and having no outlet but the street. Let us learn from our betters. Entailing property seems to be a rule of law in this country: the noble has his estates entailed, to enable him to maintain his station in society; the squire has his estates entailed; the yeoman has his estates entailed; the clergy have estates entailed upon them;—why should not the husbandman have land entailed upon him, to enable him to live comfortably?

The plan I propose is, laying it down as a rule, that a husbandman is required for every fifty acres of land; then, out of every new enclosure of land, two acres out of fifty should be set aside for the labourer, and he and his wife should have it rent free, to build a house upon it; and, on their decease, that it should be sold to others on the same terms; and, to secure that, it should be transmitted on reasonable terms, and none should be entitled to bid for it but parishioners of a certain standing;

and that it must not be relet, but the purchasers must live in it themselves; and so on to the end of time. The money obtained from the sales to be given for the education of the working classes.

To extend the plan throughout the united kingdom, and as gradual changes in society may be best, let government begin with devoting £10,000 a year for the purpose; and let the leases, as they expire, be resold, and the money devoted for the same purpose of buying lands for the husbandmen of the country, in the proportion of one acre in fifty throughout the united kingdom, to be appropriated as recommended above, when new enclosures take place. That the land should be bought in parishes where it can be had cheapest; but in no instance should more than ten acres be bought in one parish at the same time; and that in parishes where twenty husbandmen are necessary, fifteen should, in the course of time, be provided with two-acre tenements, and in that proportion throughout the united kingdom of Great Britain and Ireland.—I am, Sir, your obedient servant,

CADOGAN WILLIAMS.

BRIDGEND, Sept. 6, 1843.

SAVING OF SEED CORN.

[From the "Times."]

Sir,—The following novel and interesting experiment having lately been successfully made by a friend of mine at Cheam, in Surrey, deserves a place in your influential journal:—In July, 1842, Mr. A. Palmer put one grain of wheat in a common garden pot. In August the same was divided into 4 plants, which in three weeks were again divided into 12 plants. In September these 12 plants were again divided into 32, which in November were divided into 50 plants, and then placed in open ground. In July, 1843, 12 of the plants failed, but the remainder 38 were healthy. On the 19th of August they were cut down, and counted 1972 stems, with an average of 50 grains to a stem, giving an increase of 98,600. Now, sir, if this be a practicable measure of planting wheat, it follows that most of the grain now used for seed may be saved, and will infinitely more than cover the extra expense of sowing, as the wheat plants can be raised by the labourer in his garden, his wife and children being employed in dividing and transplanting them. I have enclosed one of the stems as a sample. You will find it rather above six feet long, and stout in proportion.—I am, sir, your obedient servant,

HENRY POWNALL.

SPRING-GROVE, Sept. 9, 1843.

AGRICULTURE OF CEYLON.

The Kandyan plough is only what may be called a crooked piece of wood, something like an elbow ; it merely tears up the ground as unevenly as if it were done by hogs. They then overflow the field with water. They plough twice before they sow ; but before they give the first ploughing, they let in water upon the land, in order to make it soft and the easier to be worked. After it is once ploughed, they usually make up the banks ; for if they were to put off doing so till after the second ploughing, the soil would have become mere mud, totally unfit for banking. These banks are indispensable, not only as paths for the people to walk upon through the fields, who otherwise must go in the mud, but also to keep in and contain the water overflowing the ground. They make these banks as smooth and level as a bricklayer would a wall with his trowel ; for in this respect they pay great attention to neatness. These banks at the top are not above a foot in width. But after the land is ploughed, and the banks are finished, it is again laid under water, and remains so till the time for the second ploughing, when it becomes exceedingly muddy, as much from the trampling of the cattle as from the plough ; for the more it is stirred up the better. Sometimes they use no plough the second time, but only drive the cattle through and through the field, until the soil is made sufficiently muddy. The land being thus prepared, it is still kept overflowed with water, in order that the weeds and grass may be destroyed. They then soak in water for a night the corn which they intend for seed. The next day it is taken out, laid in a heap, and covered over with green leaves ; and thus it remains for four or five days, so as to make it sprout. They then wet it again, and lay it in a heap, covered over, as before, with green leaves ; and thus it is caused to shoot out its blade and roots. Whilst this process is going forward, they have prepared the ground for sowing, which is thus done : they have a board about four feet long, which they drag over the land by a pair of buffaloes or oxen ; not flatways, but upon its edge, which is so done, that the earth and weeds may be well mixed together ; and it also levels and makes the ground so smooth and even, that the water afterwards stands equally over it. It still remains covered with water whilst the seed is growing, and until it is become fit for sowing, which is in about eight days after it was put into water to soak. The seed being ready, they let off the water, and with boards of about a foot in length, fastened to long poles, they dress the land over again ; laying it very smooth, and

making small furrows in it, that in case rain or other water should come in, it may drain away; for more water now would very likely rot the seed. They then sow, which they do with great evenness, strewing the seed carefully with their hands. The ground now remains without any water, until the grain has grown three or four inches above it. There had been gaps made before in the banks, to let out the water; these are now stopped to keep it in; which is not only to nourish the corn, but to kill the weeds; *for they always keep their fields as clean and neat as a garden.* When the grain has grown about nine inches high, the women are employed to weed it, and to pull up where it has grown too thick, so as to transplant it to places where it may be wanted. It then stands overflowed, till the grain is ripe; when they let the water off, in order that it may become dry, and fit for reaping. *They never use manure of any kind;* but their mode of ploughing, trampling, and soaking the ground, apparently obviates the necessity for it. The Kandyans are excellent reapers, and as they had assisted each other in tilling the ground, they do so likewise at harvest. They first reap one man's field, then go on to the next, and so on, until the whole of the grain is cut; and their custom is, that every man, during the time his corn is reaping, has to find all the rest with food. The women's work is to gather up the corn after the reapers, and carry it all to one place. When the corn is to be trodden out (half a dozen buffaloes will tread out fifty bushels in a day), they select a place convenient to their dwellings, when they lay it out around a space about twenty or thirty feet in diameter; from which they cut away the whole of the turf or surface, whatever it may be. They then perform, as Knox tells us, and as I have seen, certain ceremonies. First, they adorn the place with ashes, made into flowers and branches, and round circles. They then take divers strange shells, and pieces of iron, and some sorts of wood, and a bunch of betel nuts, (which are reserved for the purpose) and lay all these in the middle of the part, and a large stone upon them. Then the women, whose work it is, bring each their burthen of reaped corn upon their heads, and go round the pit three times, and then fling it down. After this, without any more ado, they bring in the rest of the corn as fast as they can. For this labour, and that of weeding, the women have a fee due to them; that is, as much corn as shall cover the stone and the other conjuration instruments at the bottom of the pit.—*Col. Campbell's Excursions, Adventures, and Field Sports in India.*

NOTICES OF NEW PUBLICATIONS.

*An Address on the Improvement of Agriculture as an Art and Profession :
delivered at Monroe County Agricultural Society, in Rochester, N.Y.*
By Henry Colman.

This is another contribution to the agricultural literature of America by the Rev. Mr. Colman, the author of the Report noticed in our preceding number. It is the most forcible exposition of the advantages of scientific agriculture that has issued from the press; and it is as eloquent as forcible; there are passages in it far superior to any that ever fell from the tongue or pen of Channing. Channing's is that silken style, that, all pure and eloquent as it is, wearies and cloyes with its sameness; but Colman's, though lacking nothing of purity, rouses by its Doric vigour, keeps the attention awake, and excites the mind to action; and more than that, Colman's eloquence invests his subjects without involving them in obscurity.

"The improvement of agriculture," says Mr. Colman, "may be said to comprise two objects—first, the improvement of the art of cultivation—and, second, the improvement of the condition and character of the cultivator." Under the second head he says—

"It will be seen, from what has been said, that agriculture is a great art; and that its improvement demands the highest exercise of the highest powers of the mind. If there was ever a subject presenting food for intellectual inquiry, that subject is agriculture, involving, as it does, the most subtle operations, and the deepest mysteries of nature. It is the mind which constitutes the true dignity of our nature. Without it, man would be a mere machine; with it, he becomes a divinity. It is for the farmers to come to a knowledge of the true character of their great calling, and place it where it belongs, among the liberal professions, and among the most exalted of sciences. Formerly, whenever there was a lame or deformed child in the family, it was thought he would do for a tailor or a minister; and if he was a dunce or a block-head, he would answer for a farmer. These prejudices are gone, and that stock is nearly worked out. Agriculture is assuming its proper place among the pursuits of men; and, yielding to none under Heaven, in usefulness, in honesty, and intrinsic respectability, let us seek to prove, that while it presents objects to call out and interest, it is every

way worthy of the application of, the most improved talents which ever fell to the lot of man.

“Agriculture is not a mere physical effort or labour. It is a science. It is a branch of intellectual philosophy; and its improvement and perfection, if ever it is to reach perfection, are as dependent upon the application and instrumentality of mind, intellectual perception, intellectual skill, knowledge, I will add genius, as any art or science, which is the subject of man’s power or attainment.

“I am aware that this is not the light in which it is usually regarded. The public sentiment in this respect needs to be reformed and strengthened. Justice has not been done to this art. It is encouraging to believe, that in this matter, public opinion is undergoing a favourable change. I am anxious to see agriculture occupying the place among the humane, liberal, and intellectual arts, which belongs to it. But if it would reach and maintain that station, it must prove itself deserving. It may be carried to the throne by acclamation; but, as the public judgment is constantly becoming more enlightened and severe, it cannot maintain its ascendancy unless it is worthy of it. The laurels will be plucked from its brow, if they are not the rewards of merit. It can prove itself worthy to rank among the liberal and enlightened arts, only by becoming itself liberal and enlightened. Study, inquiry, reading and knowledge, are as much demanded for the advancement and perfection of agriculture, as for that of any art or science. We may expect from science, inquiry, and the efforts of genius, the same advantages here as in any other place, or objects where they may be applied.

“I should be glad on this occasion fully to illustrate these sentiments. These are important; essentially connected with the productiveness of the art, with the elevation of the agricultural profession in the public regard, and the increase of the comforts and happiness of the rural and labouring classes. But I must restrict myself in this case, and I shall therefore speak of agriculture simply as a profession.

“1. Agriculture is usually regarded merely as a mode of gaining a subsistence, or of acquiring property. As a means of subsistence, none is more sure or more honest. That which cultivation causes the earth to yield, impoverishes no one, but enriches all. As an instrument of acquiring wealth, it would be idle to pretend that it can be made the means of sudden, rapid, or extraordinary accumulation, or be compared with the numberless means and inventions, how honest and reputable I will not say, which exist in the community; but an industrious and skilful agriculturist is ordinarily sure of an honest competence, and secure

from many perils to virtue and to possession, incident to almost every other pecuniary pursuit. This, however, is a low and narrow view of this subject. To regard the acquisition and accumulation of wealth as the end of life demonstrates the sordidness of the mind. Such a man has yet to take the first lesson in the philosophy of human happiness. We are to look upon agriculture, not merely as a means of subsistence or accumulation, but as a profession, pursuit, condition of life. Every man is bound to provide for himself as far as he has the ability of doing it, and to perform his part in providing for those who are incapable of providing for themselves. He has the power of doing this, and the power is the demonstration of the duty. It is not reasonable nor just that any man should subsist on the labours of other men, unless he render in some form an equivalent for those labours. The rights of men are equal, and their duties are correspondent. Every man living in a community, and nature forbids that any man should live out of it, should do what he can for the benefit of that community. This duty grows out of the natural sense of justice implanted in the heart, and is sanctioned by the high authority of religion. But the community is best served by a division of labour. There must be much physical and much intellectual labour expended; and to work with advantage, their forces must in most cases be combined. All physical labour wears out life, degrades man, prevents his elevation, and shuts him out from some of the highest motives to improve himself, and some of the purest gratifications of which his nature is capable. All intellectual labour is equally a waster of life; exhausts the spirits; often disqualifies men from rendering the best practical services to the community; and not seldom lifts men into a world of mere fiction, to delude them with gilded visions, which make the common blessings of life distasteful, lead them to disdain its ordinary and most useful labours, and render them the feverish victims of discontent, melancholy or despair. If the sufferings of men, whose lives have been exclusively devoted to literary pursuits, or to mere intellectual labour, could be depicted on canvas, in their variety and extent, in all their strong colours and deep shadings, we should shudder at the picture. If we could see the tortures of ill success, the corrodings of envy, the terrible disappointments of ambition, the mortifications of vanity, sensitive to the slightest breath of censure, the pangs of neglect, the burning pains of an excited competition, and the writhing agonies of utter failure to win the meed of popular applause, where the consciousness of merit was well founded, and the promises of success were brilliant, the humblest labourer, who honestly earns his daily bread

by his toil and sweat, would find little occasion for the envy with which these classes are so often regarded. He would see reason to acquiesce in a condition, which, if not open to the honours of literary success, is not subjected to the perils and mortifications of failure; and if it supplies no wreaths to adorn his brow, is sure not to be doomed to bleed under a crown of thorns. I would not speak with disparagement of any of the honest professions of life, and every trade and profession is honest which is innocent and useful. In a civilized community, the wants of men are multiplied to a great extent. As plenty increases, luxury must be expected to increase; and when luxury increases, artificial wants are multiplied, as insects are hatched out under a summer's sun. Artificial wants become transformed into actual wants. Nor would I limit the wants of men to that which is absolutely necessary. Man is bound, in humble gratitude, to enjoy as well as to live. He may seek the elegant and the ornamental, as well as the necessary and the useful. So far from being a sin to enjoy the blessings which Providence puts within our reach, it is a duty; and equally a duty to increase them to their utmost capacity. What privileged dweller in the country can look upon this beautiful world, and regard it merely as a house of correction, a vast penitentiary, in which man's only portion is to toil, to be miserable, and to die. In order to produce the greatest sum of good, in order to provide for the subsistence, and comfort, and happiness of every one, and of all, many hands and heads must be at work, and variously employed; much physical labour must be exerted, much mental labour called into action, many muscles must be strained, many brains quickened. How beautiful it is, when all these physical and all these mental energies are stimulated and invigorated, and at the same time controlled, and directed, and applied, by the highest principles of our moral nature, and the best affections and sentiments of the heart. I will cast no disparagement upon any of the useful or ornamental professions in life, upon any profession, however humble, which in any way or form contributes to the subsistence of men, their improvement, or innocent happiness. All happiness is innocent, which is according to nature. Every sense and faculty with which our Creator has endowed us, in its natural and healthful exercise, is pleasurable and delightful. God intended it should be used; of course, under those wholesome restraints, which reason, experience and religion teach us are essential, in order to maintain the health and freshness of the faculty itself, and, in fact, to receive the largest amount of enjoyment. Now I do not say that one honest and useful occupation is above another, or

below another. I do not say that the agricultural occupation is above the learned profession; nor will I admit that the medical, or the legal, or the clerical profession, is above the agricultural profession. I will not admit, where fidelity and moral worth are equal, that the employer is above the labourer, or the labourer above the employer, the artisan above the scholar, or the scholar above the artisan, the officer of justice who interprets the law and metes out its severest penalties, and so tries to make men virtuous, above the charming writer of poetry, who, by his exquisite delineations of character, or his soaring and brilliant flights of fancy, seeks to make them happy. To make men happy is one way to make them virtuous. I believe with that delightful writer of fiction who has recently visited us from the father land, and whose delineations appear like transferring life itself to the canvas, and are benevolently designed to show how many real diamonds lie concealed under the heaped-up rubbish of society which we trample under foot; I say, I believe with him, 'that there is nothing high because it is high in place, and nothing low because it is low in life.' After making all these allowances, I shall give no just cause of offence, in saying of the occupation of the farmer, that none is in itself more honest, none more respectable, none has stronger claims upon the regards of the community for its usefulness, none is more favourable to virtue, and none is more sure in all reasonable rewards to industry, temperance, frugality, and good conduct. If men want the goods of this world upon other terms, whatever may be their *apparent success*, they will discover in the end that they have been playing a losing game. Now how much heart-ache, how much head-ache, how much folly and how much frippery, how much indolence, how much dissipation, how much avarice, how much fraud, how much plunder, how much oppression, how much mad ambition, how much disappointment, how much mortified pride, how much actual suffering and griping poverty, would be extinguished, if only one half the loafers and mere idlers in the community, the speculators, the brawling politicians, the useless lumber accumulated in all the professions, the miserable quacks in all three of the departments, those who kindle quarrels that they may run off with the booty, and leave both parties in default; those who cure all sorts of diseases with all sorts of nostrums; and those who profess to have found some new mode of getting to Heaven other than the good old way of 'fearing God and working righteousness;' if only one half the mere fashionables in city and country; if one half the idle and profligate young men, whom we see tied on to the ends of cigars, crowding all public places, and the idle

young women who flaunt about in the exuberance of their vanity in the cast-off clothes of the silk-worm, but, poor souls ! never could think of touching the caterpillar himself ; I say, if only half of these crowds could be induced to get by their own hands an honest living from the bountiful earth. What a beneficent change would take place, if they would expend half the mental energy, or half the physical energy, in supplying their own wants by their own labour, which are now thrown away, and leave them only a miserable burden and tax upon the industry of others ; if not callous to the shame of dependance, at least knowing nothing of that generous sentiment of honour, and that lofty sense of honest competence and usefulness, which belong only to those whose hands minister to their necessities, who wear the fleeces of the flocks which they themselves have reared, and gather their bread from fields which they themselves have cultivated."

Further on Mr. Colman says—

" I need not add that in this as in every other profession and department of life, there is an honour and a dignity far higher than any which springs from mere intellectual improvement ; let that have reached the brightest wreaths with which philosophy was ever yet crowned. Without this all other gems become dim. I cannot but be understood to mean that of moral virtue and piety. It has not come in my way to speak of this, but virtue is the offspring of truth ; and piety is only another name for wisdom. Without these no business nor condition of life can have any true honour. To these the agricultural pursuit is not unfriendly ; may I not rather say, to these no pursuit nor profession in life can be more congenial. The labours of agriculture tend to allay, rather than to stimulate the passions. The seclusion and calmness of rural life are favourable to habits of reflection and self-possession ; and if not without their perils to virtue, for what condition in human life is exempt from them, present as few as fall to the lot of humanity. To the cultivation of the religious affections, an elevated and habitual piety, what condition is more favourable than that in which man seems brought into immediate contact in all his labours with that infinite energy which "worketh all in all ;" and where the blessings which he enjoys, seem dispensed to him, not through any secondary instrumentality, but as it were directly from the Divine hand ? What heart should be touched with love, if not his, who sees everywhere the wonderful, abundant, daily, and ceaseless provision for the various wants of that infinite and varied family, which no mind can number, ever springing up in a ceaseless flood of being ? What heart should be touched with reverence if

not his, who is admonished daily and hourly to commune with God, in the changing seasons and the alternations of day and night, seed time and harvest; and who, as the priest of nature, is called upon to make the earth, carpeted with flowers, the altar of sacrifice to the great Author of all the bounty and beauty of the creation, in his open temple, vocal with anthems of praise from everything that lives, and lit up by his own quenchless fires?"

And he concludes—

"Of all the conditions of men, and I have mingled with every variety, I believe in truth that none is so independent as that of an industrious, frugal and sober farmer; none affords more the means of contentment and substantial enjoyment; none where the education has not been neglected presents better opportunities for moral, and intellectual improvement; none calls more loudly for religious gratitude; none is suited to give a more lively and deeper impression of the goodness of God. Some years since, in the most rugged parts of New Hampshire, among its craggy cliffs and rude and bold mountains, I was travelling on horseback and came suddenly upon a plain and moss-covered cottage in the very bosom of a valley, where the brave settler had planted himself on a few acres of land, which alone seemed capable of cultivation. Every thing about the residence bespoke industry and care. Being fatigued I stopped to ask refreshments for my horse. A hale young girl of about fifteen, bareheaded and barefooted, but perfectly modest and courteous, with all the ruddiness of Hebe, and all the nimbleness and vigour of Diana, went immediately for an armful of hay and a measure of oats for my horse, and then kindly spread a table, with a cloth as white as the snow-drift, and a bowl of pure milk and brown bread for his rider. I never enjoyed a meal more. I offered the family pay for their hospitality, but they steadily refused, saying that I was welcome. I was not willing thus to tax their kindness, and therefore took out a piece of money to give to one of the children that stood near me. 'No,' said the parents, 'he must not take it; we have no use for money here.' 'Heaven be praised,' said I, 'that I have found a people without avarice. I will not corrupt you;' and giving them a hearty thank-offering, wished them God's blessing and took my leave. Now here were these humble people, with a home, which, if it were burnt down to-day, their neighbours would rebuild for them to-morrow, with clothing made from their own flocks by their own hands, with bread enough, and beef, pork, butter, cheese, milk, poultry, eggs, &c., in abundance, a good school for six months in the year, where their children probably learnt more,

because they knew the value of time, than those who were driven to school every day in the week and every week in the year, with a plain religious meeting on Sunday, where without ostentation or parade they met their neighbours to gather the gossip of the neighbourhood, to exchange friendly salutations, to hear words of good moral counsel and to worship God, in the most simple but not the less acceptable form; and, above all, here were hearts at peace with the world and with each other, full of hospitality to the passing stranger, uncankered by avarice and undisturbed by ambition. Where upon earth, in a humble condition, or in any condition, shall we look for a more beautiful example of true independence, for a brighter picture of the true philosophy of life?"

The Veterinarian to September.

The number of talented contributors to the above work ensures a constant succession of valuable articles on the various branches of the veterinary art. We would not, however, have it understood, that it is useful only for the veterinarian, for there is often much in it that is exceedingly interesting to the farmer. In proof of this we quote the following article, by Mr. W. H. Coates, of Gainsborough,

**"ON THE DANGEROUS EFFECTS OF SOOT THICKLY SPREAD ON
THE GROUND.**

"Some little time ago I was sent for to make a post-mortem examination of some sheep. They were hogs in fair condition, and I was informed that they had been taken off turnips, and turned on a field of luxuriant spring wheat. Ten were down—three dead—and seven paralyzed. The respiration was hurried—the ears and extremities cold—the pulse almost imperceptible—the bowels constipated—the faeces hard and dark-coloured—occasional struggling of the limbs, but no very evident pain.

"*Sectio cadaveris.*—The intestines were free from disease, and rather flaccid—the aliment dark-coloured, and covered with mucus. On examining the stomachs, the rumen was found to be half full of dry impacted dark green food, studded over with small black specks, which on further examination proved to be soot. The reticulum contained but little food. Its surface and papillæ were covered with black specks, and what food it contained was very dry. The abomasum and its ingesta were much darker than is natural. Its villous coat had a slight inflammatory blush, and the mucous secretion was quite black. The other

viscera were apparently healthy. I did not examine the brain or spine.

"On inquiry, I found that these sheep had been turned on a field of spring wheat, which only a short time before had been manured with soot; and, no rain having fallen, or dew sufficient to enable the land or the vegetation to absorb this carbon, it had been taken up and swallowed by the sheep along with their food.

"The remainder of those that were paralyzed were destroyed: but all the others, to the number of three or four score, had cathartic medicine given to them until their bowels were well acted upon. They were then fed on linseed cake, and ultimately did well."

The Implements of Agriculture. By Allen Ransome. London: J. Ridgway.

This is the sort of book that has been much wanted by the agricultural community. Works on agriculture too often give but a confined and partial account of farming implements; and the enquirer seldom rises from the examination of such with the satisfaction that he anticipated. In the work before us, which is exclusively devoted to the consideration of farming implements, we are inclined to think that will not be the case, although the author has limited his remarks "to those which have fallen within the range of his own observation"; for it is well known that he is a principal in a house famous for the agricultural implements it so extensively fabricates, and it is therefore unlikely that any implement of moment should escape his notice.

We are pleased to see a book of this nature come forth; because, independently of the information it gives to those in need of implements, it will undoubtedly furnish data of the state of agriculture in England, which no doubter can refuse to receive.

The work in question "is the result of laborious observation and enquiry;" and as the position of Mr. Ransome afforded him opportunities of "becoming acquainted with the manufacture and trial of most of the machines in general use," the information presented is of the most valuable nature. Upwards of 160 first-rate engravings of implements are interspersed throughout the book; and the author's observations on their various uses will be found worthy of due consideration.

In the prosecution of his labours, it appears Mr. Ransome had occasion frequently to refer to the records of patents, and as he experienced great difficulty for want of an analytical index, he, with the aid of a

professional friend, arranged a list of patents which have immediate reference to agriculture and agricultural machinery, which he has given as an Appendix, and which greatly increases the utility of the work. The book is got up in a superior style, and cheap withal; and we consider we should not be doing our duty if we did not heartily recommend it to every agriculturist.

The Muck Manual: a Practical Treatise on the Nature and Value of Manures, founded from Experiments on Various Crops. With a Brief Scientific Account of Agricultural Chemistry for the Use of Farmers. By F. Faulkner, Esq., and the Author of "British Husbandry." London: J. Murray.

A valuable work for the farmer, in which the materials, character, and elements of farm-yard manure are laid before him in a forcible manner; the consequences of excessive fermentation and negligent management of such manure fully shown; as also the proper method of treating it, and increasing its amount. Mineral and artificial manures, too, have due consideration: their capabilities are estimated; experiments are detailed; and much interesting information is given. A very considerable portion of the book is wisely devoted to the management and application of manures; and a copious and highly interesting Appendix completes the volume.

Treatise on the Management and Cultivation of Forest Trees. By John Smith, Gardener and Forester to the Most Noble the Marquis of Bute. Blackie & Son, Glasgow, Edinburgh, and London.

The earlier pages of this little work are devoted to the important subject of fencing. After showing how whin and holly fences should be constructed, the author follows with the thorn; which, it appears, comes in for its share of neglect in Scotland as elsewhere. We feel inclined to quote his observations, but the management of the thorn hedge has already been fully detailed in our pages. Still, we perfectly agree with him, that when the hawthorn is properly treated it will make a most durable fence; that the expense for such care is light; and that if that expense be grudged, and, consequently, the utility of the hedge circumscribed to one-fourth its legitimate duration, we must strongly deprecate such short-sighted policy, and recommend a speedy reformation.

Mr. Smith, however, has some singular notions: he says that "there

is always a root for every branch, however numerous these may be;" and that, if a root be cut away, the branch with which he supposes it to be connected will die. Also, if the lower branches of a tree be cut away, it sustains great damage, being in a great measure deprived of the use of a number of roots, and will never attain any great thickness! He likewise lays claim to a new method of pruning, as well as a system of thinning, on the ground that he is unaware of any other forester following the same practices.

Besides the management of forest trees, there are instructions for the cultivation of fruit trees, and eight plates illustrative of the author's methods of training, pruning, and thinning.



SKETCH OF A TRIP. FROM NORFOLK TO THE AGRICULTURAL SHOW AT DERBY, JULY, 1843.

If the Royal Agricultural Society had done no other good than, by its migratory meetings, to hold out inducements to farmers to travel, it would have amply deserved our warm commendations: for what, after all, so pleasing, so instructive to a mind of any intelligence, as the contemplation of beautiful scenery—of the progress of agricultural improvement,—and a careful and diligent research into practices, novel perhaps to us, but which, on close examination, are founded on common sense, and a strict adaptation to the climate, soil, and situation of the district! And here I must be excused for making a preliminary remark or two, which are not less applicable to the general than to the agricultural traveller. There is an article of home growth well known under the name of prejudice, which, in a general way, we are far too apt to make the companion of our travels; when we are packing our trunks and carpet-bags, let not a particle of this ingredient enter therein, but cast it from us as so much useless lumber. It is not only not worth the carriage, but will be found a let and a hindrance to us wherever we may happen to go. It is a sorry commodity, and the less of it we carry about us, the better. Prejudice obscures the mental vision. It is a cataract, the removal of which, demands no professional skill, involves no risk. It is, and must be, an act of our own; but discarded it must be, or we shall constantly be viewing things and places through an imperfect and distorted medium. Having made this preliminary arrangement, a double zest will be imparted to the enjoyments of travel;—severity of criticism

will be disarmed, praise will be freely awarded where praise is due, and even in cases as we think open to censure, it will be dealt out with leniency, and not merely because the practice to which it refers may happen to differ from what we have been accustomed to at home.

I may be excused for prefacing my hasty and imperfect narrative with these remarks ; for having experienced the benefit of them myself, I have the greater inducement to press them upon the attention of others.

A party of four is perhaps as convenient a number as can be made up for such an excursion as the one of which I am about to speak. Less would imply a waste of travelling room, and more would be an infringement on comfort, both on the road and at resting places, from the increased difficulty of meeting with beds.* Commend me, therefore, to a party of four, with which number we set out on a lovely summer's morning, to meet the agricultural world at Derby.

Of the minutiae of fen-farming, I have neither time nor inclination now to speak ; but a few leading particulars connected with this extensive district through which our road lay on the present occasion, may not be unacceptable to the general reader. For my own part, I never traverse the great level of the fens without a feeling of astonishment and admiration at the changes and improvements which the last forty or fifty years have accomplished in them, and to which every year seems to be making important additions.

These improvements have their origin in a more efficient system of drainage, and a general and increasing application of the clayey subsoil to the amelioration of the surface. At the hazard of telling a twice-told tale, I will briefly recapitulate the leading features of these fen-improvements. In many cases, more particularly between Downham and Wisbeach, a spade-deep of turf is taken off, dried, and sold as fuel. This will sometimes be worth, in the gross, £70 an acre ; or, deducting expenses of raising and drying, £30 an acre. This removed, a firmer and better soil is obtained, on which a thick coat of clay is applied—an operation performed entirely by manual labour ; the clay underlying, at a greater or lesser depth, the surface soil, and the effect of which, I hardly need add, is at once immediate and permanent. From the in-

* I am here supposing that the mode of travel is by the common chaise ; but I have no objection to add to the number, if suitable accommodations be provided, and particularly in the article of carriage, which should be hired for the occasion. There are carriages which will carry six with as much comfort as the general run of chaises will four, or even three,—and not the least of this comfort is the avoidance of strapping and unstrapping the luggage at every stage.

stant the clay begins to work into the soil, the crops are proportionately improved both in quality of grain and stiffness of straw. In short, magnificent crops of wheat and beans are henceforth to be seen, where, but for this alterative manure, the farmers never aspired to anything beyond a light, ordinary description of oats, bulky enough in the straw, but comparatively of little marketable value, and generally used by way of a change, as seed on the uplands.

The practice of removing the first spade of turf, though in many cases an excellent, and, as we have seen, a profitable one, ought not, however, to be adopted indiscriminately, nor without reference to the thickness of the peat above the clay. It is a striking and well-known fact, that the withdrawal, either by natural or artificial means, of moisture from this description of land, tends inevitably to consolidate the upper stratum, and in so doing, to reduce it in bulk, by which process, the peat and clay are brought closer together. Hence the erroneous idea entertained by many, that the clay *rises*, whereas in reality, the fen *falls*. This notion of the rising of the heavier body, rather than the sinking of the lighter, though absurd enough in itself, appears to derive some plausibility in the opinion of superficial observers, from the fact, that whereas in many cases there was an interval of 15 feet or so between the surface and the clay, that interval now barely exceeds 9 feet; but this, as I have shown, may be easily accounted for on other, and, as I conceive, more rational, principles than the upheaving of the subsoil. But whatever be the cause, the fact is undoubted, that in proportion to the efficiency of the drainage, is the diminution of the space between the surface and the clay underneath. Such, then, being the case, it behoves the fen farmer carefully to ascertain the thickness of the peat above the clay, before he proceeds to what may be called an act of spoliation, by removing a portion of that soil which, after all, may be wanted to form a due admixture with the clay henceforth to be applied to the surface: in other words, he ought by no means so to lessen the body of peat, as to make the clay preponderate, which he will certainly do by bringing the latter too near the surface.

But, whatever the general management may have been, certain it is, that on no description of land has improvement made such rapid strides, as on the great level of the fens. Thirty years ago, Sir Thomas Hare offered a tract on Bardolph fen, near Downham, for £1000, now probably worth twenty times the money. Indeed, at the former period, so great was the difficulty in procuring tenants, for what was then considered a worthless, if not a ruinous speculation, that it was only by a

compulsory annexation of a certain proportion of each upland farm, at a merely nominal rent, the proprietor could preserve this part of his estate from absolute waste and desolation. A series of legislative enactments, but more particularly that known by the name of the Eau-brink cut, in process of time began to open the eyes of both landlord and tenant to the advantages of an efficient drainage; yet so little were these measures appreciated at the time, that they encountered the most violent opposition from those who have since freely acknowledged they have derived the greatest benefit from them. The Eau brink alone is supposed to have cost half a million of money; no inconsiderable portion of this sum being attributable to the efforts of the opponents of the measure, during its progress through Parliament. But passed it was, in process of time. The cut was made, and the advantages were soon apparent in the facility it afforded to the *natural* drainage of the level. Nor was this all. Steam now began to be employed instead of wind, as an agent of *artificial* drainage. The superiority of this power is now universally acknowledged. It has already formed a new era in the cultivation of fen-land, by reducing that to a certainty, which formerly depended entirely on the precarious action of the air.

But great as have been the effects of a thorough drainage of this important and now valuable district, they are not entirely confined to the mere abstraction of water, "in season, and out of season." Experience has shown, that the same land which is too wet in winter and spring, may be laid too dry in summer and autumn. Hence has arisen that admirable practice, now almost universally adopted throughout the best cultivated fen-lands, of filling the drains in a dry summer from some neighbouring river—those very drains, which, in winter, it is as much an object to keep as low as possible. A perfect control is thus obtained over the water; its presence at one season being as essential to the health of both man and beast, as its absence at another. Never was a more complete verification of the old saying, "Water is a good servant, but a bad master." There is something to me very delightful and refreshing, in the sight of a fine clear current of water, in place of the stagnant muddy pools and channels by which the face of but too large a portion of our low lands was once disfigured and disgraced. It is the triumph of industry and science over sloth and ignorance; and this triumph is amply manifested by the absence, nay, by the seeming annihilation of agues, and those numerous low, feverish disorders, in all their varied forms, which for so long a period dispersed there pesti-

ferous influence far and wide. An improved system of drainage and cultivation has, in short, converted a sickly into a healthy country, and has convinced me that even the pestilential region of the *marremmes* of Rome, the *Pontine marshes*, or the *Campo morto* itself (field of death), may, by suitable means, be rendered as salubrious and productive as any part of our English fens. The following description of the *Campagna* of Rome by a modern traveller, will furnish a melancholy, but I fear, a true picture of their neglected, but naturally fertile tract.

“The sun rose gloriously, revealing the wide *Campagna* of Rome, which stretched around us as far as the eye could reach—a vast desert—surely nothing on earth can be more imposing than the approach to Rome; for many miles in every direction, the city is encompassed by barren tracts of country scattered with ruins; the far spreading waste lies in death-like silence, and the few human beings whom you meet, are like spectres mourning over the destruction around. It is as if the curse of heaven was on the country; as if, in sinking, the mighty empress of the world had drawn into the vortex that engulfed her, the whole surrounding country, leaving it like herself, a vast and desolate ruin. As we advanced across this lonely *Campagna*, as every step brought us nearer to Rome, what thoughts crowded on our memory! The contrast of former glory and present desolation presses upon the heart, and teaches a lesson which philosophy might vainly strive to inculcate.

“The *Campagna* is thinly peopled, owing to its being infected with malaria, which gives rise to a species of low fever. The effects of this are dreadful during the summer months; hundreds of the poorer inhabitants are annually swept off by it; all who can do so, fly from its fatal influence to the mountains, but poverty compels many to remain. These dwell in miserable hovels, and are principally shepherds, whose sallow faces and emaciated forms strongly excite compassion. They wear a curious dress of sheep skin, with the wool outside, generally dyed a dark mahogany colour; and in addition to this, have often a kind of apron of goat skin.* One of these picturesque figures we saw sitting on the side of a gentle slope, watching his flocks as they browsed below; his wife was seated near him, in her bright scarlet boddice and green petticoat, with a pendant head-dress of white linen and silver bodkin,

* According to Chateauvieux, this clothing is recommended by the medical men of Rome, as the most likely to resist the attacks of the malaria or pestilence; but how this can prevent the ill effects of the air passing to the lungs by respiration, I own puzzles me to make out.

spinning thread from a long distaff, the spindle whirling quickly either side, while playful children sported around them: it was a group for an artist."—*Letters from Italy*. Pp. 110—112.

But to return to Old England. Our route lay through the extensive and rich parish of Thorney, where we were to take up one of our fellow-travellers, and under whose hospitable roof we abode that night. This gentleman—why should I conceal his name?—Mr. Robert Layton, is one of the numerous and respectable tenants of his Grace the Duke of Bedford; and, judging from the specimens of his crops we had an opportunity of seeing, fully bears out all that I had been led to expect, both of the value and extent of his occupation. It may be fen land, but it is of a very different quality to that around Downham. No peat, but a rich, deep, alluvial soil, admirably adapted both for grazing and tillage. Heavier crops, both of wheat, beans, and oats, it has rarely been my lot to see: and here it was, that I was more particularly struck with the superior management of the water, both as it related to the winter drainage and the summer supply. The improved state of culture may be inferred from the fact, that whereas but comparatively a few years back, there was little or no wheat sown in the parish, the annual growth is now not less than 5000 acres; and in the parish of Whittlesea, on the same level, as much as 7000 acres. If we take, as we may very fairly do, other places in the same ratio, it will give us some idea of the immense increase in the production of this article alone, and furnish the best criterion of the value and extent of modern agricultural improvements on this description of land.

From Thorney we proceeded next morning towards Nottingham; not as our nearest route, but as affording a better view of a district (strange to most of us) than we could have obtained by joining the railroad at Syston, near Leicester. The first twenty miles or so, between Thorney and Stamford, were highly interesting, as affording, if possible, still more striking evidences of fen improvement than we had yet seen. On the Old and New Borough fen (chiefly the property of Sir Culling Smith) the crops were magnificent, particularly of wheat, which appeared to occupy one-third of the arable land, instead of oats, as formerly. Indeed, where not under restrictions to the contrary, some were in the habit of taking wheat every other year. Nor is this much to be wondered at, as it is supposed to be the best fen-land ever cultivated. This tract is extra-parochial and tithe-free. It was, not many years back, an open common, on which the occupiers of thirty-three parishes around used to turn cattle and other stock. I was sur-

prised at the excellence of the roads, especially as I inferred that, like other parts of the fen district, materials were very scarce and dear. It is, however, a singular fact, and a most favourable circumstance for the inhabitants, that on New Borough fen there is a spot of about ten acres of excellent gravel, from which most of the roads in the neighbourhood have been made.

In breaking up the land from its original wild, or common state, the safest and best plan is stated to be, to pare and burn for cole-seed two years together, and then take a crop of wheat. The two burnings are recommended as a preventive of the attacks of the wire-worm, to which the following wheat crop would otherwise be subject: but, after this period, the paring and burning are usually discontinued by the best farmers, as not only a waste of soil, but a needless expense. There is, if I remember right, a greater breadth of grazing ground in the Old Borough fen, than in the New; and I hardly need add, of excellent quality. Here, too, we noticed the adoption of the practice I have already adverted to, of filling the dykes, or drains, with river water; the advantages of which were abundantly manifest in the healthy condition of the cattle and other stock, with which these rich pastures abounded.

I am aware of the crudeness and imperfection of the foregoing statement; but, such as it is, it will not be wanting in utility if it be the means of inducing the agricultural traveller to turn aside from the beaten road, and devote a spare day or two to the personal inspection of a district which will amply repay him the time and trouble of so doing.

Before quitting this district, however, I must point out a circumstance which cannot fail to excite in the mind of a stranger, as it did in my own, no inconsiderable degree of surprise. I allude to the singular disproportion of the labouring classes to the quantity of land under cultivation. How were such crops got in? And how are they to be harvested? Here are acres and acres of as fine corn as can grow, but where are the hands to cut, and secure it in the barn, or stack-yard? A solitary cottage now and then sends forth its curling smoke to break the monotony of the sea-like uniformity of the landscape, for the fens affect not the picturesque; but surely the number of such dwellings would seem to bear but a small proportion to the numbers actually required for the purposes of cultivation; and in truth it is so, the requisite supply being obtained from the more populous districts of Norfolk and Suffolk, and no inconsiderable portion of it from Ireland. These latter I was informed, were generally hard-

working, excellent workmen, but in many instances, had excited a foolish jealousy on the part of the English strangers, who too often regarded them as interlopers; and but for the interference of their employers, would get rid of them *vi et armis* if they could, or, in common parlance, make the place too hot to hold them. The combined interests of both master and man have, however, prevented "the natives" from carrying their wishes for extermination into any very serious effect, and poor Pat therefore continues to enjoy the privilege of dry, if not very warm, lodging, in some convenient barn or out-house allotted to him for the purpose; the *locale* of which is sufficiently apparent by the Sunday display, on the banks and hedges, of such of his travelling washables, as he or his wife (for she sometimes accompanies him over the "say") are rash enough to venture on submitting to the operation of rubbing and scrubbing. It would, perhaps, be a matter of some difficulty to distinguish to what class certain articles in these miscellaneous wardrobes may be said to belong, or for what uses designed. Doubtless some were originally shirts, or what by courtesy may be still so called, their present appearance indicating but too plainly, that ruins are not entirely confined to matters of stone and brick, and that other things besides walls may become ragged by time.

Pursuing the road to Stamford, we pass by some of the Earl Fitzwilliam's estates at Glinton and Etton; the houses and farm-buildings on which, substantially bespeak the respectability if not the opulence of both landlord and tenant. Thence to Helphstone, Pointon, and Barnack, the last-named place having, it is said, supplied the stone of which Ely cathedral was built.

We here approach the Marquis of Exeter's estate, and skirting the edges of the park, on an eminence of which stands Burleigh House, very soon find ourselves in the pleasant bustling town of Stamford.

Our next stage was Oakham, the road thereto being rather hilly, and much of the arable land consisting of open fields, ploughed as such land very often is, in the midland counties, in winding furrows, and up-rigged, as we call it in Norfolk. On our left, embosomed in wood, and in a finely undulating park, apparently of considerable extent, was Normanton, the seat of Sir Gilbert Heathcote. A few miles further brings us to Whitwell, the Noel estate; and just previous to reaching Oakham, we pass a splendid mansion, the residence of the Hon. Mr. Finch, at Burley on the Hill. Oakham, though a place of no great size or importance, is the capital of the county (Rutland). It was market-day; but whether from the time of year, the time of day, or from what-

ever other cause, the attendants were "few," if not "far between," and but little besides gossip was going on.

From hence we proceeded to Melton Mowbray, of hunting notoriety ; and a goodly country it is for the gentlemen of the scarlet cloth, wherein to exhibit the bravery of both man and horse. Fine, bold, open sweeps form the leading characteristics of the landscape, and to the initiated, we may readily conceive that a more fitting spot could not have been selected as the head quarters of our modern Nimrods ; nor, in truth, a finer spectacle than that presented by the meet of the Melton hunt on a first-rate field day.

Our next stage was Nottingham—(20 miles)—much of the land but poor, and the crops, both of corn and hay, very backward. About Plumtree, however, within six or seven miles of Nottingham, the land becomes more kind, and better adapted to the purposes of tillage, and so, indeed, it continues all the way through a rich vale to the town ; on entering which, we were greatly struck with the general air of neatness about the place, and the superior management of the roads. We all agreed that, a firmer or better constructed road could not be found, than that leading into Nottingham from Melton. And then, again, what a fine level of meadows extending along the banks of the noble Trent : those immediately adjoining the town are devoted to the purposes of recreation and healthful exercises. At the time we passed, vast numbers of all ranks and degrees were enjoying the various delights of a fine summer's evening : some in quietly strolling about the green turf, others engaged in the more active and athletic game of cricket, for which Nottingham has been long celebrated ; nor is this to be wondered at, when one considers the many advantages enjoyed by the town's people in the possession of their beautiful training-ground.

After a late dinner at the White Lion Inn, we took the train to Derby, where, thanks to the kindness of a friend, we found every thing in readiness for our reception, and enjoyed, during our stay, all the quiet comforts of a home.

The next day we devoted to sight-seeing, and were well pleased with the many objects that presented themselves to our notice, from the marble works of Mr. Hall, whose attention to us as perfect strangers deserves our special mention here, to the very curious and interesting museum of natural and artificial curiosities, valuable pictures, statues, &c., &c. This institution is alike creditable to the taste and spirit of the inhabitants, and I think I may say with truth,

that of the many I have seen of the same nature, I do not recollect one so well arranged, and in which the confusion of visitors going and coming is so carefully guarded against. To show the interest taken by the town's people in this noble institution, it is said that at the end of the first fortnight after it was opened, it had been visited by more than 20,000 persons—a pretty strong proof, that where Englishmen have the opportunity, they lack not the taste to enjoy the highest species of mental enjoyment when presented to them, as in the case before us, in a cheap form. It was gratifying to see such an amalgamation of rank, from his Grace of Devonshire to the humblest mechanic, all bent on the same object, the inspection and admiration of the most curious productions of nature and art. But who is that pleasant-looking gentleman in black, discoursing of or with the skeleton of an Ichthyosaurus, as if they had been on terms of intimacy ever since, aye long before, the flood? Who? why the celebrated Dr. Buckland, an antediluvian of the first water; a very Noah in his way—with this difference, that as Noah preserved his specimens living and entire, the Professor contents himself with their dry bones; and very precious are they in his eyes, and very interesting does he render them by his disquisitions on their quondam habits, properties, and domestic histories.

Amongst the lions of Derby I must not omit to direct the attention of all strangers, more especially those who have a taste for horticulture, and I see not why agriculture should be excluded, to the Arboretum, not very long since opened to the public, in the confines of the town. It is a delightful spot, and will be a lasting monument of the manificence, public spirit, and taste of its founder, Joseph Strutt, Esq., by whom it was projected, planted, and, finally, presented to the town of Derby. I ought to state that the design and execution of this interesting spot, was intrusted to my excellent and intelligent friend J. C. Loudon, of whom it may be truly said, that his performance of the task assigned him was worthy the occasion. To his account of it in his "*Gardener's Magazine*," (I regret that I cannot lay my hand on the No.) I must refer the reader. It is in an admirable state of neatness. The trees are thriving beautifully, and a very complete system of labelling furnishes the visitor with a full, and, I doubt not, an accurate history of each specimen. Each label is like a little picture framed and glazed; the written or printed description being under the glass, and of course protected thereby from the effects of weather. The label frames are of cast-iron, and in form resemble miniature music stands—(I sketch from memory)—thus :



On the show, both of cattle and implements, it is unnecessary for me to speak, except in general terms. The public papers and other sources have furnished correct and ample reports of the proceedings thereat: suffice it to say, that it fully bore out the expectations I had been led to form of it, as the best exhibition that had yet been presented to the farming world; not in one branch in particular, but in all. The exhibition of implements took place on a farm about four miles or so from the town; and the land was anything but propitious for a fair trial of their merits. The society have been blamed for this. I cannot help thinking, a little unjustly, because they cannot be answerable for the lightness or heaviness of the soil around the place of meeting.

Various implements require various soils; but where there happens to be only one sort of soil, and that very stiff and unmanageable, how should it be but that many and signal failures will and must arise? To all these, the trial is no *fair* trial. The implements are good enough, but they were not intended for such land. Now, among many others that might be named, I will take but one, Garrett's patent horse-hoe, an implement of acknowledged merit; but which I will defy any one to say, either had, or could have, a fair trial on this occasion. It neither was, nor I will venture to add, could be, appreciated by more than one person in fifty who saw it. My friend, Allen Ransome, spoke feelingly, and, as some thought, rather warmly, upon this point. He contended for the necessity not only of suitable land, but of competent judges being selected, in order that the different implements, many of them brought thither at an enormous expense from a great distance, might be fully, fairly, and sufficiently tested. The exhibitors, whose mouth-piece he had the honour to be, felt that on both these points they had cause for complaint. They came not there for the amusement of the public, but from motives of utility, well and truly to try the issue between that public and themselves.

This open straight-forward address, elicited from Lord Spencer very high commendation. "He admitted most frankly and unreservedly, that the implements had not had a fair trial; and he entirely coincided in opinion with Mr. Ransome, that whatever other arrangements the society might make, the best possible arrangements ought to be made for the trial of implements." Nor is this an unreasonable wish on the part of the exhibitors. Few, perhaps not even the society themselves, are aware of the enormous expense of bringing over so many men, horses, and other appendages as are required for these exhibitions; and they

certainly do feel that they have a right to be considered as something more than mere caterers for the amusement of a crowd of idle spectators. Their views are of a higher order, and all they ask is, that the society will help to carry them out.

I have little to add on the subject of the show; but there is one point connected with it, on which I would fain say a few words, and to which I have the less reluctance, as my remarks will equally apply to Southampton or to any other place in which the future meetings of the society may be held. The good people of Derby have, it is feared, greatly overrated the pecuniary advantages derivable from a meeting of this nature. They have pulled the string too tight, and by the enormous charges they have made for beds and other accommodations, have driven their visitors away, instead of attracted them to the place. Even the Duke of Devonshire, who would have engaged a house for the period of the show, is said to have been asked such an enormous price, that, rather than submit to it, his Grace rode to Chatsworth every evening. One thing they seem to have wholly lost sight of—the facilities of ingress and egress offered by the railroads. Who would pay a guinea for a bed in a crowded town, with other necessaries in proportion, when half an hour's ride in a fine summer's evening, through a delightful country, would ensure him superior comfort, at a far cheaper rate? When the meeting was held at Bristol, for instance, numbers, instead of remaining in the town, went every night to Bath, twelve miles off; but what is that on a railroad? Just so did many, instead of complying with the Derby prices, fly off to Nottingham, Leicester, or anywhere within reach of the rail. Observe, I speak, not from my own experience, but from the relation of others; for, so far as regards the excellent people with whom we had to do, my companions will bear me out in saying, that our only difficulty was to induce them to take anything; charge they would make none; and it was only by stratagem we at last succeeded in leaving behind us a trifling *douceur*, by no means commensurate with the comforts we had enjoyed, or with what others similarly situated as ourselves were obliged to pay.

Another error of miscalculation on the part of the Derby tradesmen requires notice here; as it may be the means of guarding those of other places similarly situated, from committing the like mistake.

The show-yard, both of cattle and implements, was fixed at Litchurch, about a mile and a half from the town, and probably half that distance from the railway station. On approaching it, we noticed with

surprise and regret, that all the outskirts and avenues to the yard were occupied with refreshment booths ; which, had the show continued as many months as it was to do days, would hardly have repaid the speculators the capital embarked in such an outfit. It was obvious the thing was overdone. They had miscalculated, not only the numbers, but the description of customers they were likely to have. Those who came from a distance, came, not to eat and drink, but to see the show. Besides, the town was too near to render all this preparation necessary. Of the many thousands who entered the yard, I much doubt whether more than a very small proportion went into the booths at all. I had the curiosity to visit one of them, at an hour when, if at all, it might be expected to be fully occupied. A table was spread for probably forty people, and I was the only one who sat down to it ! The charges, too, were very moderate, and the fare good.

Wishing to make the most of our time, we took advantage of a spare half day, and drove to Kedleston, Longford, and other seats of more or less note in the immediate vicinity of Derby. The former is a noble mansion, the property, though not the residence, of the present Lord Scarsdale. Its entrance hall, like that of Holkham, is ornamented with the native marble, and very beautiful is it in both. We were particularly struck with the magnificence of the timber in the park, through which we rode on our way to the house, particularly the oaks and broad-leaved elms. Mr. Loudon asserts, and I doubt not its correctness, that there are silver firs in these grounds varying from 100 feet to 130 feet, or perhaps 150 feet in height.

From Kedleston, we extended our ride to Longford ; a place doubly interesting to us as Norfolk men, and which we could not approach without feelings of deep emotion ; inasmuch as it was here that that great and glorious man, Thos. William Coke, so long the pride of our county, of England, of the world, drew his first, and latest breath. This was the scene of his childish years, as of his mature old age. We felt it was a spot to reverence and to love ; one that it would have been a sin in any farmer—a double sin in any *Norfolk* farmer—to have passed unvisited. We made ourselves known to the Countess ; she was alone ; and the heartiness and urbanity of our reception can never be forgotten. It was alike worthy of herself, and of him whose hospitality knew no bounds. Any friend of *his*, she said, would always find a welcome there. We deeply regretted the necessity of making so hurried a visit, but, previous to going, Lady Leicester insisted upon showing us the gardens, and the leading features of the place. Not the least inte-

resting of these, was a humble thatched cottage, a short distance from the house, to which, she said, Lord Leicester always had great pleasure in directing the attention of his friends. It was there he first went to school! and, singular to relate, a school it remains to this day! All we saw convinced us that the hand of improvement had been there. Alterations, not less judicious than ornamental, had been planned, and in part executed. That hand had ceased to work, yet the spirit still hovered around the place; and the main object seemed to be, to finish what he had so well begun, particularly in reference to the welfare of the tenantry; their improvement in practical agriculture, and, as a necessary result, the general improvement of the estate.

In process of time, we quitted Derby; and, being anxious to show my companions a country to which they were as yet strangers, we hired the same carriage that had conveyed us from place to place during the week, to take us to Matlock (16 miles from Derby). Passing through the populous town of Belper, in which are situated the extensive cotton works of the Messrs. Strutt, we skirted the banks of the Derwent, and after a most delightful ride through almost every variety of scenery—vale, rock, wood, and water, were safely housed at Hodgkinson's hotel, where we intended to remain no longer than to enable us to take a hasty glance at the principal wonders of Matlock, as, for instance, the petrifying well, one of the caves, Mr. Vallance's museum, and the like, and then to get to Rowsley Hotel (our ultimate destination that way) to a late dinner. To our no small dismay, however, we made the discovery when too late, that there were no horses to be had in Matlock, nor any likely to be at liberty till late in the evening; a circumstance the more annoying, as Mr. and Mrs. Severn, the worthy host and hostess of the Rowsley Hotel, were, we fear, expecting us at dinner. However, consoling ourselves with the reflection that we could not perform impossibilities, we quietly bided our time, and reached our comfortable quarters at Rowsley Bridge, not too late in the evening to enjoy the beauties of this very splendid ride of seven miles.

Having been there before, I had no hesitation in recommending the Rowsley Hotel to my friends, not only as abounding in every thing that can add a zest to travelling, but as a convenient point from whence to diverge to Haddon Hall, Chatsworth, (from the former of which it is situated only 1 mile, from the latter $2\frac{1}{2}$ miles,) Bakewell, (3 miles), and even Buxton, (15 miles distant).

Our first excursion was to Chatsworth, which, though I had visited on more than one occasion before, produced in me, as I have no doubt

it would, were I to visit it twenty times together, feelings of ever fresh delight. The magnificence, the extent, the endless variety of the pleasure grounds, cannot be appreciated by mere description, however vivid. The enormous tropical conservatory erected within the last few years under the superintendence of Mr. Paxton, is of itself an object well worthy the undivided attention of the traveller. It is by far the most splendid thing of the kind in Great Britain. Its height, we were told, is 65 feet; and "in general design," observes Mr. Loudon, "it may be compared to a cathedral with a central aisle and side aisles." It covers more than an acre of land. It is heated by an adequate number of fires, placed underground; the smoke from which is conveyed by a tunnel up the side of the hill, at the back of the building, to a considerable distance; so that for any visible sign to the contrary, the place might be heated by magic, the smoke spirited away by the same mysterious agency, and in short the whole thing a creation of fairy-land. We had a note of introduction to Mr. Paxton, but unfortunately that gentleman was at the time so engaged with the Duke and his friends, in the body of the conservatory, that we had no chance of a word with him. We had, however, ample opportunity to examine and admire the beauty and even substantial nature of this immense structure; which, albeit, entirely of glass, possessed a degree of strength, of which one would have thought so fragile a material was incapable. We had had a very severe storm but a day or two before, attended with much rain and hail. Our guide told us that neither then, nor at any time since its erection, had there been a single pane of glass broken. This is mainly owing to the judicious manner in which the glass has been applied; the quality of the material itself being of course unexceptionable. It is called the ridge and furrow system of roofing, and the credit of the invention is I believe due entirely to Mr. Paxton. A thicker and longer kind of glass may be used by this method, and consequently a better light may be obtained, and more cold air excluded than by the common glass. But the time will not admit of my enlarging on this subject. Indeed Mr. Loudon has given so full a description of Chatsworth Conservatory in one of his *Gardener's Magazines*, (I think in the vol. for 1840, but I cannot now refer to it) as to supersede the necessity of any thing further thereon.

The cascade and fountains were in action; but though very beautiful, had a certain air of formality, which, it appeared to me, might easily be broken to the great advantage of the general effect. Mr. Loudon questions the practicability of doing this satisfactorily; but I own I see

no great difficulty in the task ; although I wish to speak with all due deference to the opinions of those so much better acquainted with the locality than myself. The channel which conveys the water downwards from the grand cascade, consists of a series of steps confined within a sort of sloping trough, with straight unbroken sides. Surely it would take from the artificial character of this part of the fall, if these sides (now of regular masonry) could be changed into a more rugged, and consequently a more natural form. A canal is all very well in its place, but in a mountainous region it is *out* of place, and a brawling irregular brook is better.

Again, the bed of the stream is smooth and unbroken, save by the flight of steps aforesaid. Why not intersperse it with masses of rock, so disposed as to appear less the work of art than of nature, and in short, impart to it a character which it now wants—that of a mountain torrent ? They are now actually bringing together huge blocks of stone to form an approach to the grand conservatory, a sort of artificial rock-work, which, when finished, will doubtless have a good effect, from the very circumstance of its irregularity and apparent want of order in the arrangement. Now, if but a twentieth part of these rocks, in minute masses, were appropriated to the bed and sides of the stream aforesaid ; surely the general effect would be greatly improved. I own I have too high a regard for any one of these rude mountain streams, to wish a single stone away, the abstraction of which might tend to deprive it of its genuine native wildness—if art I must have, it shall be as much like nature as I can get it.

I have said nothing as yet of the kitchen gardens ; and in fact, the superficial glance I was enabled to take of them, does not enable me to say much. They are at a distance from the hall, and occupy about 19 acres of ground. When Mr. Loudon visited them in May, 1839, “ there was much early forcing, both of vegetables and fruits ; grapes being required at table all the year round ; and in winter and spring 3000 pots of strawberries are forced annually.”—(*Gard. Mag.* 452.) In going through them, one cannot but be struck with the surprising manner in which all the difficulties of soil and climate have been surmounted by the intelligence and unceasing assiduity of Mr. Paxton. He is truly the presiding genius of the place ; and it is but a just tribute to his merits to state, that whatever may be the taste and talents of the Duke of Devonshire for botany and horticulture (and far be it from me to question either), his Grace has, on more than one occasion, acknowledged that all he knew was derived entirely from Mr. Paxton.

Amongst the hot-houses (twenty-two in number, if I mistake not,) there is one devoted to orchidaceous plants, objects rather of curiosity than utility, but of great interest to the admirers of rare botanical specimens.

And now, what of the house—that splendid edifice, the work of so many eminent artists, the mere catalogue of whose names and productions would swell out this paper to a most inconvenient length? It would be the height of presumption in a mere passing visitor, like myself, to attempt even a brief sketch of its many and great beauties. A very elaborate, and, I have no reason to doubt, a very correct account of it appears in “*The Peak Guide*,” of Stephen Glover. To that work, and to many others of a similar description, I must be content to refer the general reader; but there is one particular department of art, for superiority in which, the walls of Chatsworth have been so long and so justly celebrated, that I feel as if it would be a heinous sin of omission, not to point especial attention to it. I allude to the exquisite specimens of wood carving, by Grinling Gibbons, Samuel Watson, and other contemporary artists, from 1690 to 1712. Without stopping to analyze the claims of these eminent men to that credit which, justly or unjustly, has been generally awarded to Gibbons, I may venture unhesitatingly to say, that this species of decoration alone is well worth a journey, and a long journey too, to Chatsworth. “All the wood carving in England,” says Allan Cunningham, “fades away before that of *Gibbons*, at Chatsworth. The birds seem to live, the foliage to shoot, the flowers to expand beneath your eye. The most marvellous work of all is a net of game: you imagine at the first glance, that the game-keeper has hung up his day’s sport on the wall, and that some of the birds are still in the death-flutter.”

In the *Sculpture Gallery*—but I must tear myself away from these scenes of fairy-land. They are not adapted to mortals—least of all to mortal farmers.

My party was all agog for Buxton. And so—to Buxton we went; and a glorious ride we had. Wild—nay uncultivated—but still glorious. Who that has travelled this road but remembers the beautiful scenery at and around Ashford, with its marble quarries and marble works?

Returning from Buxton to Rowsley, we spent our last evening under the roof of our worthy host and hostess of that ilk, and next morning paid a visit to that far-famed baronial residence, Haddon Hall: a truly venerable relique, and one of the most complete remains of the kind existing. But, if I had little time to discuss the merits of Chatsworth,

still less have I to dwell on those of Old Haddon—which must be seen to be appreciated as it deserves—it is a noble relique of the olden time, and well deserves a more minute inspection than we had time to bestow on it.

The time was now fast approaching for a separation to our respective homes. An open carriage conveyed us to Ambergate, a station on the Leeds and Derby Railroad; from the latter of which places we proceeded direct to Birmingham. And here we parted—all, I have reason to believe, well pleased with the doings of the past week.

If I am asked, what is my impression as to the state of the farming in the several counties through which we passed, my answer would not, perhaps, be so favourable as many might wish or expect. Thirty, aye forty years ago, I remember they ploughed with four, and sometimes five horses at length. They do the same now. There is no improvement here. At that period their crops were overgrown with weeds and rubbish. They are so still. There is no improvement here. Every crop was sown broadcast. It is so now. No improvement. Verily the English Agricultural Society has a great deal to do yet.

SAMUEL TAYLOR.

WHITTINGTON, Stoke Ferry, Norfolk,
September 19, 1843.

HARVESTING CORN—REAPING *versus* MOWING WHEAT— THE PRESENT HARVEST.

Among the many and great improvements of the day, certainly it does appear to me that the farmers of our Eastern District can claim but little, if any, merit on the score of either neatness or efficiency in the harvesting of corn. It is very true, that in riding through the country, one sees a great increase in the system of mowing, instead of reaping wheat; and, as a necessary consequence of this, a proportionate addition to the size, and perhaps even to the number of the stacks: and this, on the face of it, appears to warrant the belief that something like an improvement on the old reaping system has been effected; but let us consider the matter coolly and dispassionately, and, it strikes me, we shall find the supposed advantages have been very much overrated. There is, I admit, a semblance of neatness in a field after mowing, in the shortness, and I will add, the cleanness, if it has been raked, of the stubble; but if, as I contend, this neatness has been purchased at the

expense of slovenliness elsewhere, as for example, both in the stack and in the barn, what is it but robbing Peter to pay Paul?

In the first place it is robbing the land. I may be told that the stubble has not been taken off the farm; it is in the stack. Admitted: but that is precisely the place where it is least wanted; nay, where it is sure to create extra expense in the process of thrashing; for suppose a heavyish crop, the average height of which is, say five feet in the sheaf. The same crop reaped, would probably not exceed four feet each sheaf. The extra foot of straw, and be it remembered, the stiffest part of the straw, has thus to pass through the machine or run the gauntlet of the flail, at an increase of labour and money, the amount of which very few ever take the trouble, as not thinking it worth while, to ascertain. Then what shapeless, unsightly things are these mown wheat stacks! I hate to see a company of men engaged in such slovenly higgledy-piggledy work. No stacker can make good work of such unwieldy bundles as he is overwhelmed with, and indeed he has no object in attempting it. Time was, when this species of rural architecture excited something like ambition in the breast of the head man, or whoever had the charge of it; but now, the main object seems to be, to huddle the crop together as fast as possible, without the least regard to appearance, and very little, as it seems to me, to safety: for a wet harvest would make miserable work of these loose clumsy faggots, which by courtesy pass for sheaves.

I am aware that it has been attempted to prove the very reverse—that the sheaves of mown wheat fence better than those of reaped wheat. I have no doubt that some mown wheat may be tied and shocked well, any more than I have that reaped wheat may be, and very often is, tied and shocked very badly. The better these operations are performed, undoubtedly, the greater will be the safety of the crop. But I maintain, however well done, that neither of them are, in the case of mown wheat, what I call *safe*. They will not, and cannot, stand a wet harvest. Fortunately for us, we live in a climate, the most highly favoured perhaps, for its dryness, of any in our island; and so long as this dryness continues, all goes on smoothly enough. We are capital fair-weather sailors; but the moment a change comes on, we are as helpless as a water-logged vessel, and give up all for lost. The question then arises—to what extent are we justified in relying upon climate alone for the safety of our various crops? It appears to me, we are *not* justified in so doing; but that it would be wise and prudent to make some provision for such a contingency, however rare, as a rainy harvest. Perhaps, on

this point, I may not be wholly uninfluenced by prejudice, from which, I am quite ready to admit, I can claim no particular exemption over my fellow-men. It was my fortune to reside as a farmer, for many years, in districts far less favoured by nature than Norfolk or Suffolk : it might almost be said of them, that there rain was the rule, dry weather the exception. How was this untoward state of things provided against? By very careful shocking, and moreover, and above all, by hooding or capping the different shocks ; a practice, be it observed, by no means confined to wheat, but extended as well to barley and oats, and this too, no matter how fine the season.

I once took it into my head to mow and shock my wheat, without putting the usual caps on. Everybody thought me mad, and in truth I began to think so myself ; but, as luck would have it, I muddled through, though not a little scared at the risk I had run ; a risk I could not help likening to that incurred by the simpleton who laid twenty shillings in a hollow tree, to see whether it would be safe when he came back that way. Tell me not of the *expense* of the practice. You might with equal sense withhold that of insurance against fire, hail, or any other calamity. Yet many a sufferer by the late storms would, I fancy, have considered it but a penny-wise pound-foolish proceeding, to grudge the trifle it would have cost him to secure the hundreds, perhaps thousands, of which he may have been deprived by flood or tempest.

But to return to our main subject. Mowing wheat has been objected to by some, as detrimental to the ensuing turnip crop, by withdrawing from it the stubble ; which, if ploughed in, would do much good, by keeping the land open : to say nothing of the benefit immediately conferred on the soil by the mixture and gradual decay of such a body of vegetable matter. I have elsewhere called this robbing the land : at the same time I wish to explain that I do not attach so much importance to the operation of stubble as a meliorator of the soil, except it be a stiff clay, as some are disposed to do. Cold stubborn lands cannot be kept too open ; consequently mowing in such cases is a dead robbery. The only excuse for it, *on any land*, appears to me, the abstraction thereby of weeds and rubbish of all kinds ; but even this is only a shifting of the evil, for, though taken from the land, they are, as I said before, in the stack ; and I much question whether the seeds so abstracted had not better have been left to vegetate, and be destroyed by the operations of a summer fallow, than be laid up to mix with the straw of the next year's muck.

Hitherto I have said nothing of another species of robbery, fully as important in its consequences, though seldom or ever deemed worth a moment's consideration ; I mean that inflicted on the poor by mowing. I do not for an instant contend for the *legality* of gleaning. It is a practice existing only by sufferance ; for every man has a right to do what he will with his own. Whether his crops be reaped or mown, he may, if he please, prevent any one from taking what is left. Still less would I encourage the absurd idea of reaping merely that there might be gleaning. What would this lead to ? Reaping badly, that there might be more to glean. And here a word of admonition to labourers in this work. For the great increase of mowing of late years, they have mainly to thank themselves. They have slubbered over their work, I must needs add, so disgracefully, as compared with other counties, that they have positively driven many to mow, who would far rather have preferred reaping. They have cut their own throats. We are in the habit of hearing such warm, nay, almost amounting to fulsome, encomiums on Norfolk farming, that, in our own estimation, we are all perfection ; but let any unprejudiced person go into some of our southern and western counties, nay, even to poor despised Wales, and they will find much in harvest practice which it would be well if they would imitate, particularly in reaping and shocking corn. I think I may venture an opinion, that nine out of ten of our farmers, on going over many of the stubbles I have there seen, would involuntarily exclaim—"If we could ensure as good reaping as this, we should never mow."

[Still it must be admitted that, unless there be strong grounds for the change, these are not the times for depriving the poor of a privilege as old as the days of Ruth and Boaz.]

If mowing wheat is practised at all, it seems to me that it ought to be confined to short crops, and to be performed with a Hainault, or cradle scythe ; an implement not half so well known as it deserves to be ; indeed I am not aware that I ever saw one in this part of England. What are the principal evils of mowing wheat, besides those already mentioned ? Undoubtedly one is the want of regularity in the swathe ; the straws being too often laid head and heel together ; the result of which is, not only a slovenly appearance in the stack, but a real loss to the farmer ; for it must be obvious, that in a moist season every ear which touches the ground will become discoloured, and too often vegetate ; and every one knows how very slight a proportion of sprouted wheat will deteriorate the sample. The Hainault scythe will

entirely prevent all this, and so far remedy one of the principal defects of mowing. Referring to some of the back numbers of the *Farmer's Journal*, I find in that for August 29, 1814, in a report of the Christchurch (Hants) Agricultural Society, the following passage relating to the Hainault scythe—"It is certainly not only a more expeditious, but a less laborious tool than the reap-hook, or sickle; and the work of two boys, after such short practice, proved how easily the use of it is acquired; and even by stout girls and women, to whom Mr. Rose strongly recommended its practice, as it requires but little stooping; and one girl last year, who is now at service, could work as well with it as almost any of the men. It is equally useful in cutting beans and vetches, and particularly advantageous when corn is laid."

The following opinion of the judges on the above occasion fully corroborates the above paragraph. Its advantages, they say, are—

"First, in dispatch nearly one-half.

"Secondly, in saving of straw and corn.

"Thirdly in the sheaves being tied with a single band, and hooded in *kyle* or *shock*; and thereby less liable to injury from the weather."

But it is not to wheat alone that the benefits of a little attention in tying, &c., &c., are confined. A very few years have elapsed since we were told of the prodigious advantages which were experienced by some farmer (I am sorry I have forgotten his name) in the neighbourhood of Norwich, from tying and shocking a field of barley, which, in consequence, escaped the fate of all the neighbouring crops, that of being blackened and otherwise greatly damaged by the wet. It occasioned no small sensation at the time; as if it had been a new invention, forsooth! instead of a practice as old as the hills. But what came of it? Did any of his neighbours profit by the *successful* experiment thus set them by an intelligent farmer? I verily believe not one! So difficult it is to break the fetters of long established custom.

A few words on the state and prospects of the present harvest. Wheat is confessedly lighter by several pounds to the coomb than the crop of last year. In point of cast, too, it will very probably fall short of that of last year. The marketable value is exceedingly various; fluctuating in one market no less than 15s. per quarter, viz.: from 42s. to 57s. How is this? Why, it is not so much the relative thinness or plumpness of the grain, as its dampness or dryness: and what is this owing to? The fickleness of the weather, and needless exposure thereto; the inevitable result of inattention to the precautions of which I have been speaking. Will any body tell me that this difference, or half this

difference in price would not have been repaid over and over again by the adoption of some sort of covering in the field ?

Barley is also lighter in the bushel, though far better in this respect than many ventured to hope ; and as to yield, from all the information I have been able to collect, it may, on light warm soils, fairly compete with last year's crop : though not so on heavy lands. Great care is necessary in harvesting, on account of the quantity of layer and other green matter in it, the natural result of a showery season. Much fear was expressed a few days back that we should have had a certain proportion of black barley, but a favourable change in the weather has tended very much to dissipate this fear.—*Bury Post*, Sept. 6, 1843.

T.

Since writing the above, I have made an excursion into some of the best parts of Suffolk. Mowing wheat is not so prevalent there as in Norfolk ; but it evidently is on the increase, more particularly on those heavy lands where the non-fallowing system is beginning to obtain. I allude principally to the district around Needham market ; where it formerly was the practice to fallow not only for wheat, but, after wheat, to make what is called a long fallow for barley—in other words, to omit turnips altogether, and let the land lie idle between the wheat and barley crops. The modern system of cultivating these strong lands, is so far altered as to banish fallowing, if not entirely, at least, greatly to modify the practice. For instance, the wheat stubbles were, when I saw them, in course of being ploughed up for the reception of rye, vetches, or something of the kind suitable for spring feed. Their having been mown, was pointed out to me as an advantage ; as it enabled the ploughs to go to work as soon as the crop was removed, which could not have been done after reaping ; as in that case, the stubble must have been mown, and got off by a separate operation, requiring both time and money.

Another deviation from the old system of cropping, is the substitution of tares, or some other plant of the kind, for clover, which too often fails if repeated at four-year intervals. I found many fields of mustard and cole-worts, which had been sown for the purpose of ploughing under as manure for wheat. Of course, they were in a young state, perhaps from 6 to 12 inches high. The grand object seemed to be, to keep the land covered with *something*, and thereby to prevent the growth of weeds, instead of by the more expensive process of ploughing, harrowing, and working it in a state of fallow. The argument is, that as all land, if left to itself, will produce vegetation of

some sort or other, the farmer may as well select that, which, whether fed off, or ploughed in, will be the most serviceable to his purposes, both in cleansing, and in enriching his land. Be it what it may, the exploding of fallows has followed its adoption. Many even of the wheat stubbles, not intended for immediate breaking up, had been sown with ryegrass for early spring feed for sheep: one effect of this non-fallowing system being to induce the keeping of a larger stock of sheep, where formerly scarcely any were kept; so that both in stock and crop, the improved system admitted of considerable additions to the produce of the farm. Here, therefore, the mowing of wheat was evidently an advantage; and, as having in the former part of this paper spoken against the practice, it is but fair to state what I observed in its favour.

One point I noticed as being particularly attended to, even on the stiffest and most hilly grounds—the *land was invariably ploughed up a full pitch*. There was no shirking. The horses were good: and they were made to do their utmost, although never more than a pair was allowed to a plough. I will be bound to say that in many of the mid-land counties I have lately visited, land, not so stiff, would have taken four, and very likely, five horses to work it. This, too, implies a driver forsooth! and after all I very much doubt whether the ploughing would have been so effective.

The harvest was mostly in, except here and there a field of barley; and beans were beginning to be cut, and in a few instances, were carried. Hop-picking, too, was begun around Stowmarket. The crops appeared tolerably good. A merchant told me, in relation to the wheat crop, that he had found equal quantities delivered last year and the present, to weigh $2\frac{1}{4}$ lbs. to the bushel lighter in the latter than in the former case.

September 17, 1843.

THE BRITISH FARMER'S MAGAZINE.

New Series.

VOL. VII.

JANUARY, 1844.

NO. XXVIII.

LYTHAM AGRICULTURAL ASSOCIATION.

The members of this highly and well-deserving popular farming society held their annual meeting on the usual show ground, on Tuesday, the 3rd October, and, as had been fully anticipated, the various descriptions of stock, farm implements, &c., were calculated to realise the most sanguine expectations of all its warmest friends and supporters. Among the horses and pigs were numerous animals possessing those rare perfections found only in breeds of a very superior kind. It would, perhaps, be something like invidious to particularise the stock of individual sires, where so many of each were entitled to and received great admiration; but it will not materially detract from the merits of the progeny of Amurath and New Fashion to say, that the colts of Peter Lely attracted a large share of attention; however, the stock as a whole will go very far to re-establish to Fylde breeders the enviable name and fame possessed by their predecessors in the "days of auld lang syne;" and the Lytham Society's meetings will henceforth be anticipated by dealers and others as opportunities for selecting horses capable of giving the fullest satisfaction to their most fastidious customers. So also was

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the warmest commendation merited by the pigs, particularly if a breed possessing the aptitude to fatten and produce animals of enormous weight may be allowed to be a fair criterion to entitle it to preference. It was, as it has been on several former occasions, most gratifying to find that the cottagers were again most successful competitors, for the pigs exhibited by members of that class were of the most superior description ; and whether such pigs may be intended to make a full house at the homes of their respective owners, or the proceeds from the sale are to be devoted to any of the numerous purposes for which money is so valuable an agent, it is quite evident that they will be found very valuable acquisitions to those who own them. The show of pigs on the present occasion will therefore preserve a high character for the breeders and feeders connected with the Lytham Agricultural Society. Of the cows it may be said, that there were among the younger descriptions many very promising animals ; so that when the intention is realised of introducing a new bull to the district, possessing most of the excellencies of the choicest breed, the future produce of the neighbourhood will no doubt speedily become of the most profitable quality, whether as respects the shippin or the market. With respect to the sheep exhibited, they were not numerous ; but some of the Leicesters were very deserving of admiration. This particular kind of farm stock does not seem at any period of the farming interest of the Fylde district to have received particular attention or encouragement : a circumstance which is doubtless much to be regretted, as was ably pointed out by Mr. Fisher Hobb, in his observations at the after dinner proceedings ; however, from what transpired from the remarks of others, it is quite probable after the draining (we may say the immense draining operations, for in the present year the enormous extent of 103 miles have been completed in the society's district) shall have been still further advanced, sheep stock will claim the same attention in the Fylde which it receives elsewhere, to the great advantage of flock-holders. The specimens of green crop exhibited were likewise not numerous ; but the Swedes and other kinds of turnips, and roots of mangel wurzel, were most creditable to the growers. We have now the gratifying duty to perform, of speaking with unmeasured commendation of the greatly diversified show of all kinds of improved farming implements, in ploughs, harrows, turnip and straw-cutters, steaming apparatus for the preparation of cattle food ; in short, articles of every description, the use of which may assist the agriculturist in all his various departments to secure the immeasurable advantages which scientific improvements are capable of imparting to the practical man, by

which inventions the important views of the Royal Agricultural Society, and indeed every other farming society, will be most fully and profitably carried out—viz., by uniting science with practice. We have now given a brief sketch of the several descriptions of objects which claimed attention at the Lytham Show, and we think it will be admitted that they are calculated to establish the belief, that the views of those who originated it, and particularly the generous intentions of Mr. Clifton towards his numerous tenantry, have been crowned with the most admirable degree of success. The reproach against this portion of the Fylde, as having become best known as a snipe-shooting district, has been effectually removed by the immense draining operations completed and still in progress; and the horse stock, which had gained an unenviable notoriety in the estimation of the lower classes of dealers, has now so far regained its bygone character of superiority, as to have won the attention of the best judges and most liberal patrons to its claims of admiration.

GROOMBRIDGE AND BORDERS OF KENT AND SUSSEX AGRICULTURAL ASSOCIATION.

The annual meeting for rewarding meritorious labourers, and awarding premiums to the breeders of lean cattle, was held at Groombridge, on Wednesday, the 4th October. The number of stock was about the same as last year, but greatly superior to it in point of excellence; in fact, some of it was worthy of being exhibited in a fat stock show, and if so exhibited, would, we have no doubt, gain prizes. David Salomons, Esq., also exhibited a pair of exceedingly fine bullocks, seven years old (not for a premium), which were greatly admired. The ploughing came off in a field belonging to Capt. Aitchison, R.N. There were 15 competitors, and, taking them upon the whole, we never saw ploughing executed in a more workmanlike manner. After the work had been completed, A. Pott, Esq., addressed the several candidates in a very neat and appropriate speech.

AWARD OF PREMIUMS.

Stock.—Earl of Abergavenny's prize of £2 for the best cob or filly—D. Salomons, Esq. £2, by D. Salomons, Esq., for the best bull—Mr. Snashall. £2, by Baden Powell, Esq., for the best three-yearling heifer—A. E. Fuller, Esq., M.P. £2, by Mrs. Jackson, for the best

two-yearling heifer—Mr. Hammond. £2, by the association, for the best pair of two-yearling steers—Mr. A. Hall. £1 1s., by Mrs. Jones, for the best boar—Mr. G. Wickens. £1 1s., by Capt. West, for the best sow—Mr. G. Wickens.

Roots.—Swedes and mangel wurzel, D. Salomons, Esq. Agricultural carrots—Mr. G. Wickens. White turnips—Mr. W. Wallis, Hartfield.

The judges of the ploughing were Messrs. Whitewood, Collett, and Johnson; and of the cattle and roots, Messrs. Killick, Delves, and Hale.

The whole of the prizes having been distributed, the members repaired to the Crown Inn, where an excellent dinner was served up by Miss Hughes. The chair was taken by Capt. Aitchison.

In the course of the evening, the chairman said that it would be well for the members to enter on a discussion respecting the experiments they might have tried in improving their crops by artificial manures. He knew that many gentlemen present did not agree with him on the value of soot; but he had tried it for wheat, and afterwards sowed tares, and then oats, and in each case got a good round crop. The quantity which he used on an acre was 50 bushels; the cost, with the carriage home, was £1 12s. The field adjoining that which was ploughed that day, was manured in that way, and he would call on Mr. Hale and Mr. Ferguson, who saw the wheat before it was cut, to tell them what sort of a crop there was. Those who were in the field that day might judge from the stubble that it was not a bad one.

Mr. Hale said he saw the wheat which had been manured as the chairman described, and he must say he never saw a better crop in his life. But he thought probably that the season was particularly favourable last year for soot. If it had been a very dry summer, he was of opinion saltpetre would have answered better. Mr. Roper said they had tried nitrate of soda, rape dust, nut dust, and guano, as top dressings for wheat, which was laid on in the spring. They found that the best crop was produced from guano. They used 3 cwt. to the acre, and it cost £1 16s. in London. Mr. Woodgate, of Cowden, stated, that on a piece of wheat, part of which was manured with yard-dung, and the other part guano, it was plainly discernible where the two manures separated; the show, on that part where the guano was laid, produced straw 6 feet high. He laid 2 cwt. on the acre. He also found that it answered well on his hop land at the rate of 10 cwt. to the acre.

The bines were stronger the whole of the summer where it was laid, and the hops were much greener and larger. Mr. G. Wickens sowed some wheat in a field where one end of it was dressed with dung and mould, and the other end with lime and mould. It was a very poor field, and there was no manure in the middle of it. In the spring he put guano on that part which had not been manured at the rate of 2 cwt. per acre, and the odds were very great in its favour. He had 6 acres of oats that were looking very yellow and badly, and he top-dressed them with guano. He left one warp in the middle of the field, and there was not half the oats on that warp that there was elsewhere. He also tried it on three rows of turnips one year. The other part of the field was well manured with mould and horse-dung. When the turnips were pulled up, he measured those where the guano had been placed, and there were $17\frac{1}{2}$ bushels; and on the three adjoining rows which were manured with horse-dung and mould there were 13 bushels. All were sown at the same time, and had the same tillage. He always threw lime over his turnips just as they began to come up, as he found it preserved them from the flea; at least, the flea had never hurt his crops when he had served them in this manner. The guano also soon forced the plant out of the reach of those destructive insects. He used 3 cwt. to the acre for white rounds, and 4 cwt. for Swedes.

Some one present asked Mr. Wickens what sort of land it was where he found so much benefit from guano for wheat, and how he had previously cropped it? Mr. W. replied that it was a very poor field. He one year sowed it with wheat, then trefoil, and the following one broke it up, made a bastard fallow, and sowed it with wheat. It was on the last crop of wheat that he used the guano. 2 cwt. per acre was enough; where he used 3 cwt. the crop was so strong that it fell. He mixed it with coal-dust, which was better than wood-ashes. Mr. Hammond, jun., said that they had used guano at the rate of $2\frac{1}{2}$ cwt. per acre on wheat, and 10 cwt. on hops. The wheat was greatly benefited by it, but they could see no difference in the hops. It was put on the hops just at the time they came into burr. The chairman had used half a pint of guano, mixed with three pints of wood ashes, to 12 hills of hops, and the hops were much greener and larger, and the bine stronger than where none was used. Mr. Wickens said that a neighbour of his had some guano from him for three rows of turnips, which were greatly improved by it. The next year the farmer sowed the field with barley, when a person coming along one day asked him what made a narrow slip down the field so much better than the rest of it. The farmer said

"he did not know," when his son remarked, "I lay it was where you put that stuff you had from George Wickens;" and sure enough it was. When the barley came into ear, the ears were as long again as any in the other part of the field, and continued so till harvest; indeed, the difference was so great, that one of his labourers told him he could tell to an inch where it was laid, in the "middle of the night, blindfolded." The chairman said he had his doubts as to the great benefit of rags for hops, and asked Mr. Read, who was an old grower, if he had as high an opinion of them as he had 10 or 20 years ago, especially as compared with guano. Mr. Read said he had; he liked rags very much. Mr. Roper also expressed himself as being favourable to dressing hops with rags. The chairman wished to know if Mr. Roper would rather manure with £6 worth of rags one year, and leave the ground without manure the next, than put 48s. worth of guano to the acre each year? Mr. Roper thought it would not be prudent to leave the hops one year; it would be better, perhaps, to use rags one year, and guano the next.

LIVERPOOL AGRICULTURAL SOCIETY.

The thirteenth anniversary of the Liverpool Agricultural Society for the show of cattle, horses, pigs, sheep, implements, &c., was held on Thursday, the 5th October, in a field at the top of Sackville Street, near the North Haymarket. The weather being very favourable, the attendance was numerous, especially after two o'clock, when the price of admission was reduced to a shilling. The agricultural show held on Friday at Holywell might have prevented the attendance of a number of gentlemen, and many heads of stock; however, on the whole, the show was excellent.

There were some fine bulls, but few compared to last year. The milch cows were more numerous, and amongst them some valuable beasts. There were some very superior yearling heifers and young bull calves. The show of stallions was deficient, although there were several very useful and powerful horses. There were more draught horses than usual, and several of them very excellent. The sheep were more numerous, and some of them very prime. There were few pigs, but the quality was never excelled.

A portable veterinary surgery or medicine chest, prepared by Mr.

Joseph Bretherton, of Liverpool, was exhibited, which must prove a valuable acquisition to farmers.

There was a sack of very excellent white Waterloo wheat, grown by Mrs. Postlethwaite, of Speke, near Liverpool. To this lady was awarded the prize for the best cultivated farm.

Mr. Skirving, of Liverpool, exhibited some purple-topped turnips of 26lbs., produced by guano only, and large green-topped of 20lbs., from the usual manure; also some sound mangel wurzel, and some large Belgian carrots.

Mr. W. Ashcroft, of Halsall, near Ormskirk, exhibited a root of mangel wurzel which weighed 29lbs., a Swede turnip 29lbs., and a red bullock 19lbs. He had also six roots of chicory, with which coffee is now so much adulterated. The root resembles the white carrot.

There was a great variety of farming implements, amongst which were four sorts of churns, turned with handles, and an improved apparatus for steaming food for cattle, made by Mr. Richmond, of Salford.

Messrs. H. Pooley and Son, of Dale Street, Liverpool, exhibited one of their portable platform weighing machines, fitted with a pen for weighing stock; the compactness, convenience, and accuracy of which attracted much attention.

THE DINNER

Took place, as usual, in the large room of Lucas's Repository, Great Charlotte Street. Five o'clock was the hour announced; but a considerable number of gentlemen were detained in the yard of the repository till half-past five, and when the doors were opened, it was found that the best seats were occupied. Considerable dissatisfaction was expressed by the company outside, who attempted several times to force open the door. About 400 gentlemen sat down to a most excellent and substantial dinner, served up by Mr. Towers, of the Angel Hotel. The chair was occupied by the Right Hon. Lord Stanley, M.P., and at the principal table we observed the following gentlemen—Hon. R. B. Wilbraham, M.P., the Hon. E. Stanley, Sir Richard Brooke, Bart., J. Ireland Blackburne, Esq., M.P., Richard Brooke, Esq., T. Weld Blundell, Esq., William Blundell, Esq., Clarke Hillyard, Esq., Joseph Brooks Yates, Esq., Adam Hodgson, Esq., John Formby, Esq., Harold Littledale, Esq., J. Shaw Leigh, Esq., Peter Greenall, Esq., M.P., John Sheppard, Esq., James Parker, Esq., John Hayes, Esq., Wm. Hayes, Esq., Wm. Rowson, Esq., Rev. R. Battersby, Peter Wright, Esq., S. B. Chadwick, Esq.

After ample justice had been done to the good things provided, and the usual loyal toasts had been given,

The chairman said he now rose for the purpose of proposing to them the principal toast of the evening, on which he felt it his duty, in the situation in which he had the honour of being placed, to offer a few observations before he introduced the toast itself to their notice. In proposing "Prosperity and Success to the Liverpool Agricultural Association," he wished it were in his power to use terms of more unmixed congratulation than those which it was his duty, in the discharge of his proper functions, to employ. Though he did not by any means say that there were grounds of discouragement—quite the reverse—he was not able, at all events, to give that favourable account of the progress which he would willingly give; for it could not be denied that, during the last two or three years, the receipts of the society (and the receipts were a most important part of the prosperity of the society) had been falling off; and the result was, that in the course of the last year the society found itself encumbered with a load of debt; in consequence of which it was necessary to have recourse to the more than ordinary liberality of the members. This effort had so far succeeded that they were now on safe ground, and he hoped it would be with them, "Out of debt, out of danger." Being in this condition, at any sacrifice, even by a reduction of the amount of premiums, if necessary, it was the fixed determination of those who had the management of affairs, to confine the expenditure strictly within the receipts; and he was happy to add, that, so far from the receipts in the present year falling short, the amount received that day was pretty nearly the same as that of last year—whilst the entrances for stock were somewhat larger. For the future he trusted that the society would be enabled to go on steadily advancing in prosperity, supported by their liberality, and yearly obtaining fresh claims to their confidence and support. He was not about to enter into any discussion on the merits of the stock which were exhibited that day, partly because any observations from him must come at second-hand, having been detained so late that morning that he was not able to visit the yard, and partly because they would hear the subject much better discussed by the judges of stock; gentlemen who had much more practical knowledge than he could pretend to. Allow him to express his regret, if there were any foundation for the statement he had heard, that something of the falling-off in the funds of the society was to be attributed to the accidental circumstance of his having been prevented, by his private and official duties, from annually occu-

pying the place he now filled. However flattering such a supposition might be to himself, and however kind the reception they had given him, he should deeply regret that such should be the case; because he should see in it the strongest proof that the great objects of a society like this were very imperfectly understood and appreciated by those for whose benefit it was instituted. The objects of this society were of far more importance than the mere purpose of conviviality; more important than making speeches; far more important than could be answered by any public meeting. In the first place, it brought together in one common bond of interest all who were engaged in the most important interest of this great country—all who were interested in the proper cultivation of the soil, on which depended the sustenance of the population. These meetings were intended to bring all parties together for the promotion of no narrow or individual, but of a great national interest, by increasing the capacity and the skill by which the productive powers of the soil might be augmented, and, by emulation, to excite in the minds of the farmer and the farm labourer a proper competition in the great object which they were the instruments of Providence in promoting. Now, these were the great objects of societies of this kind; and, therefore, he should deeply regret if the absence of any individual should produce any ill effect on a meeting animated by such purposes, and called together by such objects. It was impossible to cast round their eyes about the country in which they lived, and not acknowledge that there had been a vast improvement in the practical agriculture of this country within the last ten or fifteen years. In producing that improvement he firmly believed that this society had borne its full share, and he should deeply regret if any circumstance whatever deprived it of that support which all who were engaged in the cultivation of the soil ought to render it. Perhaps they would permit him to make a few observations on two subjects which were of primary and vital importance to the science, for it was now becoming a science—of agriculture—without which all others were comparatively worthless. A real, effectual, and thorough draining of the soil was of vast importance in the first instance, and it was the foundation of all improvement. Now, it was quite true that agriculture was not capable of that indefinite extension by which the manufacturing interest in its rapid progress had astonished the world, and astonished itself; but it was equally true that agriculture was capable of vast extension and improvement. The surface of the soil was limited, and the capacity of the soil was also limited: but they were limited in a much less degree than was

generally supposed; and he spoke with the greatest confidence when he said, that of the waste lands of this country a vast proportion was capable of producing a large—an immensely large—outlay of capital expended upon it; and, considering the condition of the country, and the increasing population of the country, it was not only their interest, but it was also their bounden duty to exert themselves, and to apply their best energies, not of sinews only, but of the mind and intellect, to ascertain how the soil could be made more capable of supporting the population. The importance of thorough draining was universally admitted; but perhaps he might be permitted to state two or three facts as practical results, which had come under his own observation, showing that what he was preaching to them, he was in a certain degree practising himself. In the course of the last two or three years, they—he spoke for his father as well as for himself—on behalf of themselves and their tenants, had put under ground nearer three than two and a half millions of tiles, and had thus fairly indicated their belief and confidence in the success of a great experiment. And why had they done so? Every month that passed over his head convinced him that so far from having done all that could be done, they had only made a beginning, and were only doing that which it was their bounden duty, but still more their abundant interest to do. He would state one instance of the practical returns which might be expected from thorough scientific draining. In 1841 his father was about to inclose in the park at Knowsley a tract of about 80 acres. Of this 80 acres about 20 were strong clay land, with a very retentive subsoil, and the remaining 60 he remembered from his boyhood as the favourite haunt of snipes and wild ducks, and never saw there any thing else. In the course of the first year the 60 acres maintained, and maintained very poorly during the summer, six horses; and on the 20 acres there was a very small crop of very poor hay. It was impossible for land to be in a poorer condition; and they would agree with him when he told them, that in breaking it up, they had some two or three times to dig the plough horses out of the bog. In 1841, the whole of this land was thoroughly subsoiled and drained; and in 1842, what was not worth 10s. an acre the year before, was in turnips; and on that land they fed off in five months, and fattened for the butcher, 80 beasts and 300 sheep, and afterwards carted into the farm-yard 350 tons of turnips. In the present year they had a very fair crop of barley and oats, which his friend Mr. Henry would be very glad to show to any gentleman who felt any curiosity on the subject. Now he did not hesitate to say that that land was, at that moment, worth 30s.

an acre. The outlay upon it for pulling up old fences, thorough draining, tiling and breaking it up, amounted to £7 10s. per acre, just giving 20s. for every 150s. of outlay, and giving to the landlord a permanent interest of 14 per cent on the money laid out on that unpromising ground. It happened that in the same year they took into their own hands land which had been abandoned by the tenant as perfectly worthless. It was a large field of 22 acres, of very poor sandy soil. It was drained at an expense of £2 per statute acre; and in the first year they fed off on that land 120 sheep, the remaining part of the turnips being carted to the farm-yard; and he ventured to say, that at the expense of £2 per acre, the land was increased in value 10s. per acre to the landlord and 10s. to the tenant. He might mention many more instances of the same kind, but he would not waste their time, and especially as they would probably hear something on the subject from Mr. Robert Neilson, who had more practical knowledge of the subject. Over and over again he had heard from tenants that their land had been doubled in value by draining and tiling with slate soles, which had a great advantage over tile soles, being lighter, and less liable to break in the carriage. They would tell him, perhaps, that these were very expensive operations, and that the farmers could not conduct those operations. Well, perhaps they could not, unless they had perfect confidence in their landlords, or unless they had the security of a long lease. He would go further, and say he would much rather that the tenant was not at the original expense of this outlay, because, having the whole of the improvements conducted under one hand, and under one management, there was security that the work would be done so as to promote the permanent and not merely the temporary benefit of the estate, and though he was quite aware that a tenant could not afford the outlay on two or three miles of tiles, yet when the work was done by the landlord, the benefit was so great that every tenant, out of his increased produce, would be able to pay interest at 5 per cent on the money laid out. He knew instances where the result of the past year's draining had been an increase of ten, twenty, or thirty bushels of wheat the large acre; and taking the increase at 7s. per bushel, he would leave them to calculate the expense, which would not exceed in any case £15 or £16 the large acre. He would also say, that undoubtedly the system of draining, to whatever extent it might be carried, must depend upon the co-operation of a number of parties, and it was comparatively of little importance to have a field well drained if the ditches were not well cleaned out, and there was not a sufficient out-fall for the water. After some further

observations on this subject, his lordship said he had a word or two to offer with regard to fences and the laying out of farms in this country. He was no advocate for the destruction of hedges or the destruction of hedge-row timber. He was well aware that in a country so flat and exposed as this, it was not ornament only, but it was protection that was afforded by hedge-row timber. He was aware that the size of fields must bear some proportion to the size of the farm, and that the size of the farm must be proportioned to the capital of the farmer who occupied it, and, with a full conviction of the superior cultivation and economy of large farms, he would make considerable sacrifice rather than remove from any farm, too small though he might think it, an industrious tenant who was exerting himself to the best of his means and abilities to cultivate it to the best advantage. But though he was not an advocate for the destruction of the hedge-row timber, some bounds must be set to the timber, and still more to the fences. He had observed in some parts of this county fields of two acres, one acre, and even three-quarters of an acre, and the number of fences this required could lead to no profit, but did much mischief. The other day he called for a particular return of the quantity of land gained in a district of 291 acres, by the mere removal of the fences, and laying the fields properly together, and what did they suppose it amounted to? Why to 22 statute acres, or nearly one-seventh of the whole surface of the soil. But this was not the only evil, nor even the greatest evil. There were the old rotten copses, and the old disused marl-pits, which only harboured vermin,—he begged pardon, they harboured game too,—and, as a sportsman, he had no objection to that; but the result was, that in fields thus intersected, the sun and the due circulation of air were excluded, and not only were the crops smaller in quantity, but also later in time, and it was absolutely impossible that they should ripen simultaneously, part of them being unripe, part over ripe, and the whole very much inferior in value to what it might otherwise be. He had no doubt in the world that, by thoroughly draining the land, they might accelerate the harvest by ten days or a fortnight every year, and in this variable climate, so subject to cold and blight, farmers might easily calculate the advantage of getting in their crops in the middle of August, instead of the latter end of September. He knew of instances in which, last spring, farmers, who had their lands well drained, had been able to begin ploughing ten days, a fortnight, and sometimes three weeks before their neighbours could venture to put a horse upon the land. There were many other topics which he might press upon their attention, but this was the main

maxim. This was no time for the farmer to stand with his hands behind his back, going on half asleep, just as his father and his grandfather had gone before him. Fresh demands were coming upon him ;—all classes, in this stirring age, were striving in the race of competition, and it would not do for the farmer to be less active in the cultivation of the soil than others were in their particular lines of industry. It was of importance that the operations of the farmer should be conducted with true economy in time, labour, and cultivation ; that he should apply all the energies of his mind to employ both labour and capital to the best advantage. He did not consider it economy, when he saw a farmer, in the month of September, pottering with three or four men over his wheat, because he was willing to do all the labour with the help of his sons. That was no economy, for he might, by that mode of proceeding, lose a large portion of his crop by shedding and injury from the effects of bad weather. He did not think it economy when he saw a farmer lumbering along with a large heavy plough, requiring four horses and two men, to save the expense of a lighter and better plough ; and if the farmers thought they could carry on their business with such notions as these, they were very much behind the rest of the world, and they would soon find out to their cost that they were so. But with a judicious application of capital and science, with a good understanding between landlord and tenant, he did not hesitate to say, that, so far from being exhausted, the productive powers of this country were capable of being increased to an extent astonishing to all who had not carefully examined the facts. Their continued exertions and support were necessary, not only to maintain the Liverpool Agricultural Society on its present footing, but to increase its usefulness, and render it a great and most important instrument, tending to a great and most important end. His lordship concluded by proposing, “ Prosperity and success to the Liverpool Agricultural Society,” which was drunk with all the honours.

The chairman said he hoped that, notwithstanding his near connexion with the nobleman who was the patron of the society, they would not think, considering the situation he held in the county, that there was anything indecorous on his part in proposing his health ; the more especially, as in the long details he had troubled them with, they would see that he was not indifferent to the interests of the county. He begged to propose, without further comment, “ Lord Derby, the patron of the Liverpool Agricultural Society.”

Sir Richard Brooke said he had only been that moment informed that

it fell to his lot to propose a toast, which he was sure they would drink with enthusiasm. If it required eloquence or words to enhance the value of the toast he would not have stood before them, but he was sure they would receive it as he would give it. It was "The health of their President."

The chairman, in rising to reply, was received with loud cheers. He said, that although he never had reason for a moment to doubt the kindness with which, on the present occasion, they would receive him, as on many previous occasions they had received him in that room, he need not say that he was deeply gratified by the kind manner in which they had received the toast just proposed by his honourable friend, and for joining him in the approbation with which they had received the toast, he hoped in confidence, that long as was the yarn he had spun that evening, he had not spun it too long for them. But having trespassed so long on them already, he should be inexcusable, the more so, as there were many gentlemen well known who had yet to speak, if on the present occasion he did more than return them his grateful thanks. He assured them, that although circumstances had prevented his appearance there the last two years, when more imperative claims demanded his attention, yet under all circumstances and in all cases it would be his first and earnest desire to be of service to those among whom he was born, and by whom he hoped to be many years surrounded. He thanked them for drinking his health, and drank theirs in return. But before sitting down he might take the opportunity of proposing a toast—the health of those who had assisted him in performing the duties of the day. On former occasions he believed he had to complain that there was only one vice-president who attended, but on the present occasion he believed there were two—the Hon. R. Bootle Wilbraham and John Shaw Leigh, Esq. He begged to propose, "The health of the vice-presidents, Lord Sefton, the Hon. R. Bootle Wilbraham, R. Watt, Esq., and John Shaw Leigh, Esq. He regretted much that Lord Sefton was not there, for he knew how much he added to the interest of meetings like the present.

The Hon. Bootle Wilbraham replied. After thanking the company, he said he always felt interest in the success of that association. He was not a practical farmer himself, but he hoped to pick up, year by year, a little; and some time or other he might be able to carry into effect some of those excellent maxims which the president had given them; but, be that as it might, he congratulated the society that it had recovered from its debt, and he trusted that the society would continue

to improve, and that its efforts might be gradually and most deeply felt through all the districts of the county, and, so far as he was concerned, he was always ready and anxious to promote its object. On his own part, and on the part of the absent vice-presidents, he returned them his best thanks, and he sincerely regretted that Lord Sefton was not there; for, known as he was to all the individuals present, and loved as he was by all, his presence excited the warmest feelings among them, and to co-operate with the Earl of Sefton was to him the greatest pleasure.

John Shaw Leigh, Esq., also acknowledged the compliment.

The chairman briefly introduced "The Royal English Agricultural Society," and coupled with it the name of Clarke Hillyard, Esq., one of the council of that association.

Clarke Hillyard, Esq., said it was a formidable thing for a man in his prime to address a meeting like that, but it was much more formidable to one who had entered his 77th year. He had, therefore, neither the power of voice, strength of nerve, or the powers of recollection he had five and twenty years ago; but it was another most formidable thing for him to get up and attempt to speak after the eloquent address from the chairman; but he hoped those gentlemen who were sitting in judgment on speeches, would bear in mind that which was never lost sight of in the judgment of cattle—age to be taken into consideration. For more than thirty years of his life he had devoted the chief part of his time to the study and practice of agriculture. He would not now enter into any farming pursuits, but those who wished for information, he would recommend to them his book on practical farming. It was not a collection of scraps from sayings and doings of other men, but the details of his own true practical experience. The Royal Agricultural Society of England, he thought he might safely say, had answered general expectations, for, although its establishment could at present only be called of recent date, there could be seen in many parts of the country improvements in the cultivation of land. It had created a desire for improvement and for practical farming. It had put aside many long-standing prejudices, and convinced the farmers that they must not be niggardly in the expenditure of manual labour. The society had done much for England. It had added to the number of landed proprietors who took an interest in agriculture. This he conceived to be to the general benefit of the tenantry of the kingdom; and he had even thought in his observations that those who knew a little of what farming was were the best landlords. It had been said that he (Mr. Hillyard) held science

in light estimation. It might appear so ; and he must confess, that on the establishment of the Royal English Agricultural Society he felt not a little piqued on being told, not by a scientific, but by a theoretical farmer, that the farmers all their lives knew but little, and that they ought to be taught by science. He never meant to say that the best farming in the country was not capable of improving. It had been much improved mechanically in this country, and he did think, that by chemical aid some of the mysteries of nature might be so developed, as to enable the occupiers of the land to get a greater produce than hitherto. At the same time he would say, from his practical experience, that there was a point beyond which nature and the soil would not be forced to produce grain, although it might straw. A talented person, who had studied agricultural knowledge, might make out a very good system of farming in his closet. An astronomer in his closet might make out a good account of the moon ; but if a man came down from the moon, would they be any better off. It was just the same in farms. The system that was made in the field must be much better than that made in the closet. There were also many valuable manures ; but it was to be doubted, whether by their application they would give that extra quantity of produce that would repay their great cost. He thought that a good farm, like a good piece of roasted beef, would baste itself. But you must have dripping then, it would be said, and that would be got by having good space in their farm-yards. The best way of getting together all the urine from the cattle, was to get it absorbed in the straw, and by that means they would keep the ammonia, and everything else. Science alone could do but little, but science joined with practice could do a great deal. If science and practice went hand in hand—if science did not stand forward as an instructor to the practical farmer, but took the position of being his able assistant, then, with this union of science and practice, this country would be brought into that situation so desirable for every nation to be in—that of being independent of foreign nations for the supply of food.

The chairman then called upon the secretary, Mr. Ledger, to read the following

REPORT.

In presenting their report, the committee have to communicate that, during the past year, they have found it necessary, in consequence of the long-continued and increasing balance due to the treasurer, and other debts, principally for printing and fitting up the show-yard, to take some steps for the discharge of the same, the amount of which was

upwards of £400. Upon making known the statement of their finances to the noble patron of the society, his lordship, with his usual liberality, at once consented to give the sum of £100, conditionally that the whole amount required be raised. This offer was accompanied by another of £25 from the noble president. The committee then made a further appeal to the principal landowners, and other influential members of the society, and they have the satisfaction of reporting that their application has been responded to in the most handsome manner; and that the amount required, with the exception of a few pounds, has been promised, and the greatest part already collected. As those who have kindly contributed towards the discharge of this debt have had an explanation laid before them as to the various causes which have led to the same, it is at present unnecessary to enter into any further details. When the whole of the donations are received, which may be expected at the present meeting, or in the course of a few weeks, the debt will be immediately paid off, and a statement sent to each contributor.

With the view of avoiding a recurrence of these pecuniary difficulties, the committee considered it necessary to make a slight reduction in some of the premiums, and entirely to discontinue others, which, in their opinion, might be done without any serious detriment to the efficiency of the society; and they have now the most reasonable ground for believing that the receipts will in future be more than sufficient to meet the expenditure.

The premiums of the society have hitherto been open for competition to all parties within the district, whether subscribers or not; but in revising the rules for the present year, the committee were of opinion that the interests of the society demanded that *all claimants for farm management and crops should become subscribers*; and in order that this alteration might not operate against small farmers becoming claimants, they decided that the annual subscription of those whose rent did not exceed £150 should be 10s. This principle it was thought desirable should also be applied to the class of "rewards," by offering the prizes to such servants and labourers only as are in the employ of members of the society.

The committee are of opinion that in any future alteration that may be made in the rules, more privileges should be extended to subscribers; and also that a distinction should be made between them and non-subscribers in the charge for entry of stock, in which class the competition is unreservedly open to all parties within the district, and to subscribers beyond it.

REPORT OF THE INSPECTORS OF FARMS AND CROPS.

"Our duties commenced with the inspection and weighing of turnips in November. The society offers six premiums, for which there were twenty-six competitors. We found the crops lighter than usual, in consequence of the mildew; to which allusion was made in the report of last year. One of the heaviest crops we weighed (Mr. Thos. Robinson's, of Bold,) had been grown upon a strong soil with *guano only*; $2\frac{1}{2}$ cwt. per acre being the quantity applied. In other crops where the manure had been used, the turnips were generally *thick* in the neck, and small in the bulb, from the forcing quality of the manure, and evidently from too much having been applied. We may observe, by the way, that one of the advantages, and that not the least, to the farmer, resulting from the use of guano and other new manures, has been a reduction in the price of horse and cow dung and bone dust. Turnips are generally grown most successfully upon sandy loams, the second year after breaking up from grass, manured with bone-dust, or a mixture of horse and cow dung. The crop of one of the successful competitors (Mr. Hornby, of Weaverham), was upwards of thirty tons per acre, and was stated as being grown with one ton of bone-dust and seven tons of farm-yard manure.

"Draining, which is generally done during the winter months, had next to be inspected. The number of claimants for these premiums was ten, and the work of most of them remarkably well done. Amongst those who were not successful, and whose draining we feel bound to notice, is that of Mr. Webster, of Upton. Draining along the furrows, on the parallel or Deanston system, is becoming every year more practised. The furrow drains are frequently made either with cinders or broken stone, which material is found to answer well. Where these cannot be readily obtained, or the carting of them is considered too expensive, tiles are used; and in both cases tiles or stones are generally used for the main drains. Mr. Webster's drains were laid upon this system, with tiles both in the furrows and main drains, 3 or 4 inches of broken stone at the top of the tiles, and sods upon the stone. The furrow drains were from 2 feet 3 inches to 2 feet 6 inches deep, 10 inches wide at the top, and 4 inches at the bottom. The main drains were cut 3 inches deeper than the furrow drains. Dr. Sillar's draining, which was deeper than Mr. Webster's, was also upon this system, excepting in one field, where the irregularity of the surface rendered it impracticable. The draining done by the other successful candidates was upon the same system.

"Subsoiling land, after under-draining, has been of great service in those instances in which we have seen it adopted. If there be any subsoil on which it is the least likely to be beneficial, probably it is the very *stiff clays*. The subsoil plough is generally worked by four or five horses, preceded by a common plough with two horses, and loosens the soil about sixteen inches deep. One of the claimants has had a subsoil plough constructed, which he can work with two horses, and which must be considered a great desideratum in subsoil ploughing. We have just seen a new description of subsoil plough, at Mr. Neilson's, Halewood, and which is applicable for working between the turnip drills. It will loosen the soil twelve inches deep, is drawn by three horses, and likely to prove a useful implement.

"The inspection of farms claimed our next attention: this took place in June and July. We found the *hay crops* generally good. *Wheat*, *oats*, and *barley*, a full average crop, and the bulk and length of the straw more than usual. Whether the *yield* will be equal to that of last year, is at present uncertain. Of *beans* very few are grown in the district, but the crops we met with were all good. *Turnips* of this year's growth were, at the time of our inspection, only just above ground, and in the *rough leaf*; most of them were infested with the fly. They recovered this attack better than usual, and promised fair for a tolerable crop; but about the middle of September the mildew put a stop to their progress, and the crop is expected to be again rather light.

"The potato crop commenced well, excepting in a few instances, chiefly on wet land, where the sets *missed*. It is difficult for us to report faithfully as to the state of the crop at present, not having been recently through the district; but complaints are becoming general of not having commenced. As a set-off, however, against these, many crops in our own neighbourhood are better than usual, and are at present perfectly free from any affection of this kind.

"The clover roots throughout the district are particularly good, and promise well for another year.

"Grass has been generally plentiful this year, and both pasture and meadow lands are looking better at present than we ever remember to have seen them. During our inspection of a farm in Cheshire, (Mr. Owen's, of High Leigh), we met with very heavy crops of clover and hay-grass upon land which had been manured with bone-dust. The quantity usually applied is a ton to a statute acre; and when ground *raw* bones are used, as was the case in this instance, even much less has been found to answer."

RECEIPTS AND PAYMENTS FROM JULY 31, 1842, TO JULY 31, 1843.

Dr.		Cr.	
Balance due to the Treasurer, 31st July, 1842	£121 8 2	Subscriptions received	£389 8
Premiums awarded at the annual meeting in 1842	290 8 0	Admission of Non-Subscribers into the show-yard, 1842 ..	108 17 0
Advertising, printing, &c....	21 2 0	Entry of live stock, imple- ments, &c., 1842.....	19 0 6
Salaries of Secretary, Treas- urer, and Inspectors.....	97 5 0	Balance due to the Treasurer..	106 17 1
Expenses of committee-rooms for annual meeting, and din- ner tickets for Judges and others	52 1 6		
Travelling expenses of Judges	15 2 0		
Allowance to Door-keepers, Police, &c., and for hay and straw	10 10 11		
Miscellaneous expenses, post- age of letters, &c.....	16 5 0		
	£624 2 7		£624 2 7

The chairman, in proceeding to deliver the prizes, observed, that as the distribution of them would most probably occupy a considerable time, he would, before doing so, propose the health of a gentleman who had paid great attention to agricultural pursuits. "The health of Sir Richard Brooke, Bart., and the agriculturists of Cheshire."

Sir Richard Brooke thanked them for the honour done him in proposing his health,—an honour which he thought he did not deserve, for, though he possessed land, he did not profess to understand it. He knew, however, that agriculture was prospering on his side of the country, owing to institutions of this kind. He was happy to see that some of his neighbours had taken prizes. He had not forgotten the manner in which they had received him on a former occasion when he filled the chair. He had experienced great pleasure from attending meetings of this description, and trusted that he should have many opportunities of being present on similar occasions.

The chairman then proceeded to deliver the following

AWARD OF PREMIUMS.

CLASS 1.—BEST CULTIVATED FARMS, &c.

To Mrs. Ann Postlethwaite, of Speke, (solely dependent upon farming), for the best cultivated farm of 160 acres, £10.

To Mr. Richard Dobell, of Leftwich, (solely dependent upon farming), for the best cultivated farm of 102 acres, £8.

To Mr. William Ashton, of Speke, (solely dependent upon farming), for the best cultivated farm of 90 acres, £5.

To Mr. Thomas Wild, of Weaverham Wood, (not solely dependent upon farming), for the best cultivated farm of 177 acres, £7.

To Mr. Peter Robinson, of Rainhill, (not solely dependent upon farming), for the best cultivated farm of 80 acres, £3.

To Zachariah Sillar, Esq., M.D., of Rainford, as owner and occupier of a farm of 150 acres, for laying 19,602 yards of drains, for most effectually draining 34 acres thereof, the medal.

To George Boulton, Esq., of Harroek Hall, as tenant and occupier of a farm of 360 acres, for laying 16,428 yards of drains, for most effectually draining 27 acres thereof, £8.

To Mr. Edward James Pemberton, of Sankey, as tenant and occupier of a farm of 125 acres, for laying 11,748 yards of drains, for most effectually draining 11 acres thereof, £6.

To Zachariah Sillar, Esq., M.D., of Rainford, for subsoiling in a most efficient manner 10 acres, the medal.

To Mr. James Kerfoot, of Faenol Bach, as tenant and occupier, for subsoiling in a most efficient manner 25 acres, £5.

To the Hon. E. M. L. Mostyn, as owner and occupier of a farm of 294 acres, for laying down well with permanent grasses 25 acres thereof to meadow or pasture, the medal.

To Mr. James Longshaw, of Speke, (solely dependent upon farming for a livelihood), as tenant and occupier of a farm of 98 acres, for laying down well with permanent grasses 13 acres thereof to meadow or pasture, £4.

To Mr. John Davies, of Childwall, as tenant and occupier of a farm of 126 acres, for having judiciously covered with marl 32 acres thereof, £3.

To Mr. Peter Littler, of Knowsley, as tenant and occupier, for making the best reservoir on his premises for the reception of dung-water, £3.

To Mr. John Birch, of Orrell, as tenant and occupier, for having planted 1899 yards of white-thorn hedge, £3.

To Mr. Allen Beckett, of Sutton Hall, Cheshire, as tenant and occupier, for judiciously cutting, laying, and plashing 3173 yards of fencing, £3.

CLASS II.—CROPS GROWN IN 1842.

To Mrs. Hugh Jones, of Lark Hill, as owner and occupier, for the best crop of Swedish turnips of 8 acres, being 30 tons to the acre, the medal.

To Mr. Thomas Robinson, of Bold Old Hall, as tenant and occupier, for the best crop of Swedish turnips of 10 acres, being 29 tons 2 cwt. to the acre, £6.

To Charles Stanley, Esq., of Denhall, as tenant and occupier, for the best crop of Swedish turnips of 5 acres, being 23 tons to the acre, £3.

To Mr. Samuel Hornby, of Weaverham, as tenant and occupier, for the best crop of Swedish turnips of 2½ acres, being 30 tons 7 cwt. to the acre, £2.

To Mr. William Palin, of Stapleford Hall, as tenant and occupier, for the best crop of white globe turnips of 2½ acres, £2.

CLASS III.—LIVE STOCK.

HORNED CATTLE.

Premium 1.—For the best bull of any breed, under 4 years old, belonging to any person within the limits of the society, the medal, to C. W. Harvey, Esq., of Walton.
—Second best ditto, the medal, to Sir Thomas de Trafford, of Trafford Park.—Third best ditto, the prize, £15, to Richard Pilkington, Esq.

2.—For ditto, above 1 year and under 2 years old, the medal, to Mr. C. H. Sidebotham, of Ashley Cottage, Altringham.

3.—For ditto, above 2 and under 4 years old, belonging to any person solely dependent upon farming, £10, to Mr. John Woodward, of Daresbury.

4.—For ditto, above 1 year and under 2 years old, belonging to any person solely dependent upon farming, £5, to Mrs. Elizabeth Scotson, of Aigburth.

5.—For the best cow or heifer of any breed, in milk or in calf, £5, to Sir Thomas de Trafford, Bart., of Trafford Park.

6.—For the second best ditto ditto, £3, to Mr. Hugh Unsworth, of Blackrod.

7.—For the best 2-year old stirk or heifer of any breed, £3, to Gilbert Greenall, Esq., of Walton Hall, Cheshire.

8.—For the best yearling stirk or heifer of any breed, £5, to Gilbert Greenall, Esq.

9.—For the best cow of any breed, in milk or in calf, belonging to any person solely dependent upon farming, £5, to Mr. David Pink, of Cloughton, Cheshire.

10.—For the second best ditto, £3, to Mr. William Palin, of Stapleford Hall, Cheshire.

11.—For the best 2-year old stirk or heifer of any breed, bred and belonging to any person within the limits of the society, solely dependent upon farming, £5, to Mr. Robert Parry, of Borras Hall, near Wrexham.

12.—For the second best ditto, £2, to Mrs. Margaret Polding, of Croxteth.

13.—For the best 1-year old stirk or heifer of any breed, bred and belonging to any person within the limits of the society, solely dependent upon farming, £3, to Mrs. Elizabeth Scotson, of Aigburth.

14.—For the second best 1-year old stirk or heifer of any breed, bred and belonging to any person within the limits of the society, solely dependent upon farming, £2, to Mr. Robert Parry, of Borras Hall, near Wrexham.

15.—For the cow or heifer of any breed, showing the most symmetry, fat, and weight, £3, to Mr. Richard Waring, of Toxteth Park.

16.—For the second best ditto, £2, to Mr. John Slingsby, of ———, near Manchester.

HORSES.

18.—For the best stallion for the general purposes of agriculture, £8, to Mr. John Taylor, of Daresbury.

19.—For the second best stallion for ditto, £4, to Mr. John Ashton, of Burtonwood.

20.—For the best 3-year colt for ditto, £5, to Mr. John Jessiman, of Cornish Hall, near Wrexham.

22.—For the best yearling colt, gelding, or filly for ditto, £3, to Mr. Gilbert Halsall, of Halewood.

23.—For the best 2-year old gelding or filly for ditto, £4, to Mr. Thomas Seddon, of Windle.

24.—For the best 3-year old gelding or filly for ditto, the medal to Mr. Peter Leather, of Stretton.

25.—For the best brood mare for ditto, £5, to Mr. Henry Heskeith, of Kirkby.

26.—For the second best brood mare for ditto, £3, to Mr. Edward Ackers, of Toxteth Park.

27.—To the person not being solely dependent upon farming, who shall show the best pair of horses for ditto, the medal, to the Right Hon. the Earl of Derby, of Knowsley Hall.

28.—To the person being solely dependent upon farming, who shall show the best pair of horses for ditto, £5, to Mr. William Boyes, of Speke.

29.—To the person being solely dependent upon farming, for the second best pair of horses for ditto, £3, to Mr. William Brownbill, of Kirkby.

SHEEP.

30.—For the best pen of 3 yearling long-wool ewes, £3, to Charles W. Harvey, Esq., of Walton.

31.—For the best long-wool ram, under 3 years old £2, to Captain Barton, of the Grange, Cheshire.

32.—For the best pen of 5 long-wool lambs, £2 10s., to R. C. Lowndes, Esq., of Lowhill.

33.—For the best pen of 3 yearling short-wool ewes, £3, to Mr. John Williams, of Celyn.

35.—For the best pen of 5 short-wool lambs, £2 10s., to Mr. John Williams, of Celyn.

37.—For the best pen of 5 fat ewes, £2, to R. C. Lowndes, Esq., of Lowhill.

PIGS.

38.—For the best boar of the large breed, not more than 2 years old, £4, to Mr. Brazelia Martin, of Salford.

39.—For the second best boar ditto, £1, to Mr. Hugh Swift, of Samlesbury, near Preston.

40.—For the best boar of the small breed, not more than 2 years old, £4, to Mr. Thomas Welsh, of Toxteth Park.

41.—For the second best boar ditto, £1, to Mr. James Farrar, of Salford.

42.—For the best breeding sow of the large breed, not more than 3 years old, £2 10s., to Mr. Hugh Swift, of Samlesbury, near Preston.

43.—For the second best sow ditto, £1, to Mr. Lawrence Whittaker, of Manchester.

44.—For the best breeding sow of the small breed, not more than 3 years old, £2 10s., to Mr. William Ancil, of Manchester.

45.—For the second best sow ditto, £1, to Mr. Philip Jobson, of Toxteth Park.

46.—For the best fat pig of any breed, not more than 18 months old, £2, to Mr. John Christian, of Toxteth Park.

47.—For the second best fat pig ditto, £1 10s., to Mr. William Ancil, of Manchester.

EXTRA STOCK.

48.—To the landlord who shall keep the best stallion of any breed, to serve the mares of his tenantry gratis, the silver medal, to the Right Hon. the Earl of Derby.

49.—To the landlord who shall keep the best bull of any breed, to serve the cows of his tenantry gratis, the silver medal, to the Right Hon. the Earl of Derby.

52.—For the best pair of draught horses employed in Liverpool, £4, to Messrs. Henry Jump and Sons, of Liverpool.

53.—For the second best ditto, £2, to Mr. Robert Birkett, of Liverpool.

CLASS IV.—REWARDS.

To Francis Smith, farming labourer to the family of the Ashtons, of Woolton Hall, for thirty-four years' servitude, and good conduct during that period, £4.

To Margaret Heskeoth, farmer's woman-servant to Mr. James Lyon, of Melling, for 23½ years' servitude, and good conduct during that period, £4.

To Thomas Basnett, labourer to Mr. Allen Beckett, of Sutton Hall, Cheshire, for having cut, laid, and plashed 3173 yards of fencing, £3. Given by the Right Hon. Lord Lilford.

SWEEPSTAKES.

1.—Short-horned bull, £1 1s. each, Mr. Richard Eastwood. £1 1s.

3.—Short-horned bull, one year old, 10s. 6d. each, Mr. C. H. Sidebotham. £1 11s. 6d.

4.—Bull of any breed, 10s. 6d. each, Gilbert Greenall, Esq. 10s. 6d.

5.—Short-horned cow, in calf or milk, not fed for the butcher, £1 each, Mr. Hugh Unsworth. £3.

6.—Cow of any breed, 10s. 6d. each, Peter Greenall, Esq., M.P. £1 1s.

8.—Short-horned heifer, 2 years old, 10s. 6d. each, Mr. Gibson Carter. £1 1s.

9.—Short-horned heifer, 1 year old, 10s. 6d. each, R. C. Lowndes, Esq. £1 1s.

10.—Bull calf, under 1 year old, 10s. 6d. each, R. C. Lowndes, Esq. £2 2s.

11.—Cow calf, ditto, 10s. 6d. each, R. C. Lowndes, Esq. 10s. 6d.

13.—Stallion for agricultural purposes, £1 each, Mr. John Taylor, £3.

18.—Brood mare for agricultural purposes, 10s. 6d. each, Mr. Thomas Longshaw, 10s. 6d.

20.—Ram, one shear, 7s. each, Captain Barton, 7s.

23.—Fat pig, 10s. 6d. each, Sir Piers Mostyn, Bart., 10s. 6d.

24.—Swedish turnips, 5s. each, Mr. Samuel Bright, 15s.

IMPLEMENTS AND ROOTS.

To Mr. John Hamilton, of Tortdowald, Dumfriesshire, for exhibiting a turnip-cutter, the medal.

To Mr. James Richmond, of Salford, for exhibiting a steaming apparatus, the medal.

To Mr. William Woods, of Knutsford, for exhibiting a scarifier, the medal.

To Mr. William Skirving, of Liverpool, for exhibiting an excellent assortment of roots, seeds, &c., the medal.

JUDGES.

CATTLE.—Mr. C. Hillyard, Thorpelds, and Mr. Thomas Fair, Frenchfield.

HORSES.—Mr. Jonathan Binns, Lancaster, and Mr. Peter Carter, Aston Park.

SHEEP AND PIGS.—Mr. Wiley, Brandsby, and Mr. Pybus, Whiston.

IMPLEMENTS AND ROOTS.—Z. Sillar, M.D., Rainford, Mr. James Rose, Woolton, and Mr. Murray, Liverpool.

The chairman proposed "The health of Mr. Clarke Hillyard, of Thorpelds, and Mr. Fair, of Frenchfield."

Mr. Hillyard returned thanks, expressing a hope, that in the duty they had to perform, they had given something approaching to satisfaction. If they had given general satisfaction, they had done what others had never yet been able to do. It was some time since he had attended a meeting of that kind before, and he had heard some persons say the stock was not so good as was expected. He thought they were quite as good and better than when he was last present. He never saw a better stock of cows in his life; and they had also that best of all qualities, a disposition to give a great deal of milk.

The chairman said the next toast he would propose was "The health

of Mr. Jonathan Binns of Lancaster, and Mr. Peter Carter of Aston Park, who had acted as judges of the horses; and thanks to them for their services that day."

Mr. Binns returned thanks, remarking on the practice which prevailed in this part of the country, of bringing the horses forward with their legs covered, and also with heavy blinkers over their heads, a practice which prevented their being seen to advantage, and which was also highly injurious, as many were made blind in consequence. He hoped, however, that ere long the practice would be discontinued. With respect to agriculture, he thought the extent to which it might be carried was almost unlimited; as, by a judicious mode of management, the land might be made to produce double what it does at present, and a considerable amount of surplus labour would also be brought into operation.

The next toast was "Mr. Wiley of Brandsby, and Mr. Pybus of Whiston, the judges of the sheep and pigs."

Mr. Wiley made some remarks on specimens of sheep which had that day been exhibited. He thought they could now produce sheep in Lancashire equal to those of Yorkshire; and as to the pigs, they were of a superior kind.

The chairman said he was sorry that he had not had an opportunity of seeing the implements. He was sure there was nothing which tended so much to the improvement of agriculture. He proposed, in common with that part of the proceedings, "The health of Dr. Sillar of Rainford, Mr. Rose of Woolton, and Mr. Murray of Liverpool."

Dr. Sillar returned thanks.

The chairman said there was only one more class of prizes, and he was sorry it was not more numerous—it was that of farm labourers who had discharged their duties with faithfulness for a long period in one family. He trusted the representatives of those who were to receive the rewards were present; for there was no part of his duty in which he felt greater pleasure than in the distribution of those prizes. There was one toast which he wished to propose, and in which he thought they would all join him—"The successful, and, along with them, the unsuccessful candidates, and better luck to the latter next year."

The chairman said he had made a great omission in not noticing a class whom he should be sorry to deprive of having their successes communicated at the present meeting—it was the premium for the best cultivated farms.

The chairman said the duties of their president and vice-president

were light indeed, but there was another class of gentlemen, whose exertions were deserving of all praise, and to whom he was sure they would not be niggardly in awarding their meed of approbation. He begged to propose "The health of the committee of management, with thanks to them for their past management, and with their cordial and warmest expectations for the good success of their management for the future." He was sure he would not be considered invidious, if he proposed with that toast "The health of Mr. Ledger, the secretary of the society."

Richard Ledger, Esq., begged to thank the company for the great honour conferred upon him individually, and the committee, whom he unfortunately had to represent upon that occasion. The only reward they expected was the approbation of the members of the society. Their duties were onerous, but they endeavoured to fulfil them to the best of their abilities.

The chairman said that in proposing the toast which was generally very popular on this occasion—"Liberal landlords and industrious tenants"—he hoped they would not consider he was passing over the merits of any one class for those of another, when he named a gentleman who, as a tenant, had carried out the most spirited improvements on the farm which he at present occupied; a gentleman who had not only been at a great outlay on the farm, but had conducted that outlay with great practical knowledge and science; and he (the chairman) could only express his cordial belief and hope that his outlay would prove as much hereafter to the benefit of the tenant, as it had been to that of the landlord. To that toast he therefore begged to add "The health of Mr. Neilson."

Mr. Robert Neilson spoke as follows:—My lord and gentlemen,—In rising to acknowledge the toast which has just been proposed, and so flatteringly received, I cannot pretend to thank you in the name of the landlords, because I belong not to that class; but I beg to do so sincerely, in the name of the tenants generally, and of myself individually. The complimentary way in which my name has been introduced to you, will perhaps excuse me from the charge of egotism, in stating the results of a system I have adopted on a farm which I have held for the last three years under the Earl of Derby. It is situated in Halewood; the land is strong and deep, with a very retentive subsoil; and good drainage is absolutely necessary for the production of corn crops, for which it is well calculated. I commenced by draining upwards of 40 acres with broken stones, and though well satisfied with the result of that mode at the time, I have since had reason to approve far more of

the system of draining with tiles and slate soles, as practised by Mr. Hendrie, who superintends the general drainage of Lord Derby's property. One particular advantage of the judicious system pursued by that gentleman is, connecting all the drains of a field with each other, at each end of the field, so as to cause an entire current, or circulation of air underneath the whole field. The effect of this is to increase the temperature of the soil from five to eight degrees—a fact easily tested by placing a thermometer twelve inches deep in a field so drained, and another in an adjoining field which is undrained. I need not expatiate before so many practical and experienced men on the advantages thus produced, not only in the more even, but earlier ripening of the crop, as well as its increased quantity and safer harvesting. After draining, in the practical benefits of which, so ably illustrated by our noble chairman, I heartily concur, I strongly recommend subsoiling. This cannot be advantageously done without previous drainage; but as an auxiliary to that important grounding, I have found it of the greatest possible benefit. As an instance of this, I will mention that I drained a piece of land, (consisting of about seventeen fields, which I laid out into one), of about 35 acres, and I observed that the water came away perfectly clear. I afterwards subsoiled it across the drains, and the subsequent rains came through the land deeply tinged with iron—with which I afterwards found the substratum was strongly impregnated—a material highly injurious to the crops at all stages of their growth, and which the action of the subsoil plough was thus easily and speedily getting rid of. I beg also to draw your attention to the economy of time and labour, and saving of produce, effected by straightening fences and throwing small fields together. In one instance I laid fourteen small fields together, six of which were in a long line, and about 120 yards broad. I had, consequently, twelve headlands to turn upon. Now, taking into consideration the proneness of ploughmen to stop at a headland, to look down their furrow, to talk to a neighbour in the hedge, or various other excuses for a little rest, I am within limits in saying there is at least half a minute lost at each. Thus in laying six fields together, I gain ten headlands, or five minutes of time, which, in the instance I allude to, saves in the value of time alone 20s. every time the field is ploughed, harrowed, drilled, or scarified. It may be objected that the horses rest at a headland, but I maintain, that the horses are more harassed and distressed, by the hauling of the reins to turn on a headland, accompanied, as it too often is, by the cursing of an ill-tempered ploughman, than by the labour of ploughing the whole length of a furrow. Let

me also strongly advise you to keep your cattle in the house, both feeders and milkers. I speak from experience in saying that the latter will give more and better milk and butter, and keep steadier to it, if fed up than if turned out. Besides this, they will produce three times as much manure; and your land being thus capable of being brought more under tillage, will yield at least three times the produce it at present gives. In proof of this, I may state, in recommending Italian rye-grass to your notice, that I this year mowed a field of Italian rye-grass and red clover three times, taking an average of 15 tons of green food from the acre for each cutting. This was manured only with manure-water, the drainings of the farm-buildings, too often neglected, though well deserving the farmer's most serious care and attention. I am noticing a remark which fell from our noble chairman during one of his eloquent speeches this evening, I am induced to trespass on your time with a few words in defence of the farmers of Lancashire and Cheeshire, from, at least, a portion of the blame so lavishly bestowed upon them, for the state of agriculture in these counties. That remark, in which I am sure we all cordially agree, was, that agriculture had materially improved within the last fifteen years; but as far as my own observation goes, I must say that that improvement is noticeable only on those farms where the landlords themselves have taken the first and most efficient steps towards it. I am decidedly of opinion that a fair consideration of the position in which the tenants are generally placed, and the circumstances under which they commence their occupancy, will clearly prove that the greatest portion of that blame ought, with a few exceptions, to attach to the landlords rather than the tenants of the soil. Take the condition of a farm at the commencement of a tenant's occupation, the buildings ill adapted even for the style of farming at present so much objected to, but wholly inadequate for a more improved system, and insufficiently drained, if drained at all, and showing its capabilities of productiveness chiefly by its growth of rushes; small fields divided by wide ditches and fences deviating towards every point of the compass, rendering the approach of the plough impracticable to a considerable portion of the land; abounding also in brushwood and hedge-row timber, often of little value but as a protection to game; abstracting the nourishment of the crops during their infancy, and affording a prolific harbour for the shelter of vermin of every description, for their destruction at maturity. Look also at the tenure of such farms; either at rack-rent from year to year, without any legalised document of possession, or with a lease of five or seven years, the act of the landlord

alone, abounding with conditions protective of his interests, but none of the tenant's; in many instances totally restrictive of agriculture, by preventing the cultivation of a considerable portion of the farm, for the sake of keeping it in old meadow, and almost always tying the farmer from ploughing more than one-ninth of fresh land each year; extending only over a period just long enough to allow an enterprising tenant to expend the whole of his capital, without the chance of regaining it, except by an extended lease, for which he may have to pay an increased rent, rendered more valuable by the sweat of his own brow. Without any offer of assistance from his landlord, can he be expected to invest his capital in the improvement of property not his own, and of which his tenure is so limited, if under a lease, and so uncertain, if dependent on the will of another? Far be it from me, in these observations, to say one word derogatory of that noble feeling of mutual confidence which has caused estates to be handed down from generation to generation, through the same families of landlord and tenant; where the liberal patronage of the one, and the grateful attachment of the other form a record of occupation not easy to be disturbed, several instances of which exist on the property of a nobleman in this neighbourhood, extending over upwards of 200 years; but, looking at the uncertainty of human affairs, and the awful fluctuations of property that have so frequently taken place here, I mean to say, that such is not, as a general system, one under which a man is justified, with proper consideration for himself and his family, in embarking his capital. I assert, and I appeal to the experienced farmers around me, that seven years is not a sufficient period to admit of a farmer's regaining his outlay in improvements, unless by injustice to the land during the latter year of his lease. Give him a long lease, and he freely stretches out his hand, with the certainty of being able to bring it back, and hesitates not to lay out his capital in improvements, the benefits of which he has a fair prospect of enjoying, during a considerable portion of his probable existence, or leaving legally secured to his family, in the event of his death. Look at the beneficial effects of the system of long leases and extended cultivation, wherever it has been introduced; land increased in value, the condition of the labouring classes improved, the blessings of education extended, rents regularly paid, and the farmer himself rising in importance in the scale of society, and steadily advancing in wealth, comfort, and respectability. I feel the more qualified to make these observations, from holding a farm under a nobleman, whose liberality of sentiment and benevolence of feeling towards his numerous tenantry has been amply carried into operation by the gentleman to whom he

has entrusted the management of his property, and whose judicious arrangements and personal attention to their practical development have secured to him the esteem and grateful regard of all with whom he has thus come in contact. I can, therefore, compare what may be done under a liberal system with what has been done, or rather what has been left undone, under a contracted one. There is a tide in the affairs of agriculture, as in other things, whose onward course we must accompany, if we would keep our heads above the stream. *Tempora mutantur, et nos mutamur ab illis*, or we fall behind the age in which we live, and such will inevitably be the case, if the present system of farming is continued in these counties. It belongs to the landlords to make the first advance: but it is equally incumbent on the tenants to accompany them step by step. They are component parts of a system, whose union is strength—whose division is destruction; they are equally dependent on each other, and the hand of mutual assistance ought to be equally extended and grasped by each. To the one, I would say, set an example of liberality towards your tenant, and thereby obtain a claim on his liberality towards your farm; decrease the conditions, and extend the periods of your leases; enlarge your tenant's privileges for the cultivation of the land, and let your chief restrictive clause be—obliging him to produce on his farm a certain amount in value of manure, for every acre of land he ploughs up—a practice equally beneficial to himself and his farm. Meet him fairly and freely in all permanent improvements, and deem not yourselves degraded by putting your shoulders to the wheel which advances the happiness and improves the condition of so large a portion of your fellow-countrymen. Be assured, the social link which connects all classes of the community, will soon cause the beneficial effects of their increased prosperity to pervade your own sphere, however exalted it may be. To the farmers I would say, you richly deserve a portion of that blame of which you have hitherto borne the whole; shake off the lethargy to which you are indebted for it, and look forward instead of backward for your examples of conduct. Obtain a long lease, and whatever improvements you contemplate, commence at once, and strain every effort to accomplish as early as possible; for, rest assured, their result, if judiciously effected, will far more than compensate for the loss of interest on the capital so expended. Muck heavily, plough deep, and weed clean. Remember that weeds are the natural production of the soil, and, like other natural children, are generally strong and healthy, and, if allowed to remain undisturbed, will speedily obtain the mastery over the legitimate objects of your care,

and take the inheritance themselves ; the same field cannot by possibility produce full crops of both weeds and corn. Feed well both yourselves and cattle ; the increased work of a horse in good condition will far more than pay the increased expense of better keep. I speak from experience when I say that the best food is the cheapest ; and for every additional penny so laid out you will obtain a shilling's worth of work in return ; in addition to your horse being rendered less liable to accident from increased strength, or disease from increased vigour and health. As soon think of educating your children in an outhouse, as turning out your young stock to the inclemency of the winter season, where nothing grows but their own coats, to stare you out of countenance for your inhospitable treatment. Depend upon it, that warmth and good feeding are as essential to the early maturity of cattle as to the health and strength of a ploughman ; and you might as well expect to obtain the muscles and sinews of the one from the washings of a potato dish, as a tendency to fatten in the other from the withered herbage of a winter pasture. Our noble chairman observed this evening, that the present is a crisis in the affairs of agriculture of deep importance to all. That crisis is its birth. Hitherto England has merely been pregnant with the conception of farming, but her time is now up, and she is about to be brought to bed. Professor Liebig is the Lowcock on the occasion, and chemical science supplies the surgical skill necessary to insure a happy birth ; but whether the bantling proves a healthy and vigorous offspring, depends entirely on the united exertions and cordial co-operation of the landlords as its parents, and the farmers as its nurses. Let that co-operation once take place, and we shall soon see old England as independent of foreign countries for the production of her food, as she is of their manufactures in times of peace or their arms in those of war.

The chairman said the gentleman who had just spoken was not wanting in eloquence of language, and he was glad that he (Mr. Neilson) had the ability to arouse the company by detailing to them the information which he had obtained.

The chairman then proposed "The health of Mr. Lucas," who briefly returned thanks.

The chairman then thanked the company for their attendance that night, hoping that he might meet them again with increasing prosperity. He then vacated the chair, and the meeting broke up at half-past nine.

SUPERIORITY OF WEST BRITAIN (IRELAND) TO AMERICA
FOR ENGLISH AGRICULTURISTS.

SIR,

An article appeared in the April number of the British Farmer's Magazine, headed "Ireland versus America," which stated that land could be had here "at rates so low as 6d, 9d, and 1s, per acre; this land requiring, in most instances, a perfect system of draining." I have been at some pains to investigate this matter, and, from personal inspection, find it is the case. I visited the districts in question with Captain Fletcher, of Listowel; and near his police station, 25 miles from his residence, called Brusna, which is also 9 miles from Newmarket, 13 miles from Kanturk, and only 41 miles from Cork, there resides a farmer named Timothy Guineys; he has farms over and round the hills, 40 miles in extent; he rears all sorts of stock, and labour being cheap, he can undersell any country in the world. He has no tenants, but gives the land three years for nothing to poor families, who, with their own hands, bring the hills into cultivation. He pays them no wages, but assists them all he can, giving them lime, and carting it up the hills; they, the little independent West British (Irish) farmers of 5 to 20 acres, finding labour and turf to burn the lime, and they are all happy as princes. In three years Mr. Guineys takes the land into his hands, giving the occupants land higher up the hills. He takes in graziers, and feeds his own stock. Most of his leases are for 18, 31, and 99 years, renewable for ever. Two years back he took a farm from Lord Cork, for 18 years, for £46 per year, a block of land, same as in America, of about 400 acres, in fact an entire hill. The times have turned out bad, and his lordship has made a reduction on the rental of 25 per cent, though on a low and a long lease.

This should be generally known, that Irish, English, and Scotch landlords may get their waste lands properly cultivated, of which there are 30,471,463 acres in Great Britain; so that if English emigrants will only have the confidence to come over to these parts, I feel sure they will have better prospects than in America. I have purchased legs of mutton, 9 and 10lbs. each, for 3d. per lb., fowls 6d. and ducks 6d. and 7d. a couple, and eggs 6 a penny. The army contract for beef was well known to be only 1½d in the spring. Cattle are rising in value. Temperance has done so much, that a drunken man is not to found in 100,000: this I observed at the races at Ballybunnion, close

to this place. The people eat more food of all sorts, spend more, and a spirit of kindness, intelligence, and amiability is rapidly spreading over the country. As to Repeal Agitation, I have been more than two months travelling in these districts, having gone over fully 1200 miles, and scarcely have I heard a word about it. The people meet on "saints' days" without knowing why, and thousands come away under the impression that they went only for amusement. They care nothing about Repeal; they like a day of pleasure, as in France and Italy, and it is so considered by them.

The Fire-arms Bill is as nothing; we have fire-arms in this house (on a 400 acre farm) not registered, and never will be. We sleep with doors unlocked, and every thing in the house remains the same. We never miss any thing, though we have 20 and 30 servants on the farm. Our harvest is most luxuriant; 3, 4, and 5 tons of hay per statute acre. Fine able-bodied labourers are paid 8d. per day; we give 9d. to make the people better satisfied, and there is a sensible difference in their personal appearance, both in dress and cheerful reviving countenances, as well as in their confidence in working. To-day we have 100 labourers cutting our corn harvest (wheat, oats, and barley); and mustard seed we cut nearly a month back. The hay harvest commenced the first week in May. With common care, and paying the harvesters in money, all crops are sure to be got in quickly and safe in all seasons, the weather is so propitious. I have now untouched and well preserved the entire hay crop of 1841, in excellent condition, though it was a very bad and dangerous season for saving crops. We have often 14, 21, and 30 days of fine, fair, soft, and genial weather, winter and summer, and not a drop of water; being only three degrees from France, with the Atlantic before us, and five days' sail only from America. Snow is seldom or never known here. It is very desirable for the English emigrant to settle in these parts.

W. EDWARD HERDMON DAWSON,
of 15, Islington Terrace, Liverpool.

GUNSBORO', near Listowel,
County of Kerry, September 6, 1843.

ON THE GOOD AND BAD POINTS OF CATTLE, AND ON THE FORMATION OF FAT AND MUSCLE.

By Mr. ROBERT READ, V.S., Crediton.

The skin or external envelope in the ruminantia herbivora is an important feature in developing the disposition of cattle to fatten, and is of much import to the farmer and grazier.

A good skin is known by the familiar name of *touch*—that is, the animal should possess a mellow skin, with resiliency, moderately thick, yet loose and yielding to the fingers when gently elevated, and resuming its station with an elastic spring, as if there was underneath a tissue of wool impregnated with oil. The resilience of good skin in an animal depends on the organization beneath it, and the presence or absence of cellular or adipose tissue. The existence of this membrane constitutes the good handler—its deficiency the reverse.

The pilary or hairy covering should be thick, not coarse; glossy and soft, with an inclination to yellow, and in proportion as this exists as a quality or constituent, so is the propensity to make fat: on the other hand, a thinness of hair and coarseness in fibre denotes an unthrifty animal, more especially if conjoined with a dense firm hide or skin, and with short hair. This implies a bad handler, and is a sure indication of being a slow feeder, with a tardy disposition to increase in volume, either of fat or muscle. It is by the feel of the cutaneous tissue that a judgment is formed as to the state of maturity now, and that an opinion be formed of the condition and worth hereafter. The beautiful mossy skin, that seems like soft velvet, its peculiar feeling as if it were stretched over a bed of down, when the fingers are applied, and its easy resilience when traction is made use of, are the best and surest prognostics as to the future worth of the animal.

Physiologically speaking, a mellow skin arises from a free circulation of the vascular system through the meshwork of the cellular or adipose tissue, or those cells that are destined for the reception of fat. These tissues are considered by some alike synonymous anatomically. They are always in a moist state, from the internal cavity of the cell performing the office of exhalation. Want or supply of interstitial deposit makes a good or bad skin.

The adipose and reticular tissues are extremely vascular, more especially that portion in immediate connexion lying under it. A good and

kindly handler has a full development of this material well spread over the superficies of the external frame under the skin. The membranous tissue is a bed for the origin of the absorbents, and the adipose tissue is the depository in which the fat is deposited by the exhalents peculiar to it. These membranes participate in the character of the hide. They are more dense and inelastic, and less expansive. They do not admit of being so readily dilated by the interstitial deposit, and, consequently, are longer in acquiring a mature state in the progress of making fat.

A thick and unyielding hide, not succumbing to the internal deposit in the adipose tissue under the skin, is thus continually reacting by pressure on the absorbents, and in this manner makes the animal slow in accumulating fat on the external parts of the frame. The difference in the feel between the glossy and coarse-haired animal is dependent on the secretion from the cutis. In the thick skin it is more inspissated, and exfoliates in branny scales. In the mellow and glossy skin it is more oleaginous, which may also be accounted for. Its having a greater freedom for the assimilation of nitrogen—one of the compounds of ammonia—a chemical agent that is abundantly given off from the skin and uniting with the unctuous exudation of the cutis, gives to the skin that peculiar saponaceous feel so necessary as the index of that organ performing its healthy functions, and may be ranked as a sure symbol of early maturity.

The ears should be of a fair proportion, not over large, thin in texture, and capable of free and quick motion. A good ear denotes good quality; a coarse ear, thick and large, is generally associated with much coarseness in the animal. A good ear is nearly always found in combination with a prominent and beaming eye, with thin palpebræ or eyelids.

This development of eye is most times in unison with a good and clean horn, tending to a very slight red at the radicles or roots. This indicates also a kindly disposition to early maturity. The happy and beaming eye of the healthy animal shows contentment, a very desirable omen as to the quick growth of the animal; while, on the contrary, a heavy eye, with a want of vivacity, with thick eyelids, and a too visible conjunctiva or white of the eye, is indicative of an unhappy and restless temper, incompatible with a good and profitable feeder. The eye of contentment, of quietude, and of calm expression of countenance, is alone compatible with that temperament so conducive to accumulation of flesh and fat. These qualities, if derived hereditarily,

will be maintained throughout the whole evolution of growth. They are also well-known signs of early disposition to maturity. The hereditary principle should always be borne in mind—the old adage of “like will beget like”—whether applied to the symmetrical law of external form, of quality, of temper (either good or bad), of constitution, of a disposition to make either fat or muscle, or to any other cause inherently acquired. Therefore the only method to ensure those qualities which are so essential to the welfare of the farmer, is to commence primitively with the best and most approved principles that have hitherto been found to ensure a healthy and profitable stock.

I shall now speak of bone, as being the framework on which all the materials of the body are built. It should, when examined in the living animal, have the appearance of being fine and small in structure. It then augurs a good quality and being readily disposed to fatten, although it sometimes betrays too great a delicacy of constitution. A bone may be small from a consolidation of its structural parts, yet be capable of sustaining more weight, superincumbently, than bone of a larger size, and whose size depends only on the cellular expansion, and not on a cylindrical consolidation. A large bone maintains a coarse-bred animal, a dull feeder, with a torpid vascular action, that only tardily irrigates the frame with the living stream. Such animals have a greater disposition to lay on more muscular than fatty substance.

Having concluded my observations on the external structure, relative to the propensity animals have of making fat, I shall now offer a few opinions on the arrangement of the internal organs for that purpose.

The lungs should be large; but not occupying the chest too much posteriorly: the chest capacious, and deep anteriorly; these being the organs for preparing the arterial blood that nourishes every part.

I have also remarked, from inspection after death of hundreds of animals, that the roots of the lungs do not diminish in size so much as that portion which is in contact with the midriff in the fattening animal: lungs over large are not more productive of fat than those which are of a moderate size. My solution of this fact is, that if the lungs occupy too much of the chest in the posterior part, there is a limitation to the expansion of the rumen, or first stomach, and the animal does not enjoy so much lengthened quietude in rumination, a circumstance very essential to the fattening beast. This substantiates what I have before stated. The chest cannot be too deep nor yet too broad in its anterior external conformation; therefore, instead of attributing the full, spreading, wide-ribbed chest, posteriorly, as instrumental to the lungs, the space for the

expansion of the stomach must not be overlooked, a large digestive apparatus being required for all large herbivorous animals. The heart is an important organ in the animal frame. It is rarely found over large in the fat animal. It is the forcing pump by which the whole of the body is irrigated through the arterial tubes. If symmetrical organization pervades throughout the animal, the chances are, that the vascular action will harmonize over every part, and the deposit of fat will equalize over the whole of the body. On the contrary, an animal with disproportionate parts will have a greater disposition to lay on muscle or fat on those parts respectively that have the greatest share of vascular action.

I am now proud to state some indisputable facts. I have many times examined animals by mediate auscultation, with capacious chests anteriorly, and the lungs duly inflating them. Previous to their being slaughtered, they have, when slaughtered, lungs small posteriorly. It is also certain, that if an animal dies well, the lungs will be found disproportionate to what they must have been in the living animal.

I do not agree with the generally received opinion, nor with Dr. Lyon Playfair, that the lungs must be of necessity small when an animal first begins to fatten; but, as the fattening process goes on, the internal cavity of the chest becomes smaller, the action of the heart weaker, and the lungs diminish in size in a regular gradation from various causes; first, from limited expansion; secondly, from absorption, and by pressure of the surrounding parts; and, lastly, from quietude never allowing their due inflation, which the act of depasturation affords.

The liver is also found small. This I consider to be from absorption and internal pressure of the surrounding organs. The liver has also a diminished supply of intestinal and mesenteric blood, from the appetite not being so vigorous, and less food being eaten, as the animal grows to maturity.

I have known many animals die from accident, that, on inspection after death, have had large lungs and livers. They were in lean condition, but had every good quality for fattening; and I have no doubt would have made prime fat beasts, and whose lungs and livers probably would have been smaller when slaughtered.

I do think that Dr. Lyon Playfair is wrong in the opinion, that small lungs and livers are the best organs for the assimilation of food and fat. I think that the reason why animals become speedily fat in proportion as they approach maturity, is from the arterial action being slow, and the venous circulation impeded from the pressure of the ac-

cumulating fat. The arterial exhalents deposit more than the venous circulation can return, or their absorbents take up. Thus the harmony is broken. It is a fact well known, that very little blood of the venous kind can be taken from the fat animal. From what I have stated, taken collectively and in conjunction with the primeval external conformation of the animal, may be deducted those determinations which tend to either the formation of fat or muscle.

The tendency of certain articles of food to fatten stock, and the suitability of others to keep up the general growth, afford a fruitful field for inquiry. I shall begin with those that favour evolution of growth. A series of substances that are charged with albumen or a vegetable gelatine, are nitrogenized in the maximum:—barley, oats, peas, and beans, form examples. These substances, having much nutritive matter, make the best food for the purpose of general growth, with the various herbivorous food for the young animal; but the more such food approximates lignin, the more insoluble and innutritious it is.

Herbivorous food for the young animal is naturally required, from its abounding with several elementary principles, as ammonia, &c., in unity with earthy matter; which, taken in with the food in depasturing and uniting with the inherent formation of phosphoric and muriatic acid (and the phosphoric acid in the farinaceous food), form the phosphate and muriate of lime. Wheat, with the gelatine of the farina, constitutes the formation of bone; hence the necessity, or rather advantage, of supplying the growing animal with such a material.

The next series of substances are those which contain the saccharine principle, and are nitrogenized in the minimum. They are disposed to the formation of fat. They consist of the different sorts of bulbous or esculent roots, as turnips, mangel, beet, &c. These substances, when mixed with the nutritive matter of the farinacea, constitute the essential compound necessary for the production of fat and muscle in the animal body.

The table subjoined is one of equivalents, by the celebrated chemist, Brande, showing the relative quantity of albumen and other matter in leguminous and bulbous food.

100 parts	Soluble Nutritive Matter.	Starch.	Vegetable Fibrine or Albumen.	Saccharine Matter.
Barley	92	75	10	7
Oats	75	60	13	2
Beans	80	52	25	3
Acorns, two months dried....	69	40	27	2
Swede turnip	6½.....	½.....	1½.....	½
Common globe	4½.....	½.....	½.....	3½

This table is practically one of my own, as to the quantity of nutritive matter in the acorn. On reference to it, any one will quickly perceive those bodies which dispose to make fat or flesh: thus experience has shown the decided advantage of giving to animals bulbous roots, with those substances rich in albumen, when they are preparing for the butcher, and when growth is requisite to be freely allowed to the young depasturing beast. Gelatine, a substance naturally abundant in the vegetable creation, is also a chief ingredient in the animal tissue.

The scientific agriculturist will discover the best method on reference to the table. As far as philosophy teaches, those substances that have the property either of forming fat or muscle, are the azotized and non-azotized food in their relative proportions. The disposition of certain breeds to make fat internally, and of others externally, is a physiological fact, which can only be explained on the principle of those breeds acquiring such a disposition hereditarily, or it may be from the animal possessing such an aptitude from the method of feeding in conformity with the selection of food. Now the breed of the South Devons are coarse, bony, large animals, and not disposed to make fat on the superficies of the body, but more internally: the North Devon is a small-boned and kindly animal, and disposed to fatten either externally or internally. A North Devon is a bad handler, with other points good: physiologically speaking, we should infer that fat would be deposited internally, from the skin being thick and inelastic, showing the absence of those tissues that are for the reception of fat externally. Suppose we have a South-hammer, a good handler, with a mellow and plastic skin, and every other denotation of being disposed to fatten, the probability is, that the fat would be deposited externally. In my humble opinion it is so with every other breed. We must attend more to the external form and quality, in conjunction with locality, climate, and soil. Guernseys or Alderneys make fat but very indifferently externally. I well know practically, that an animal of either breed, with a good skin and good bone, &c., is inclined to fatten on the outside; but, when such is the case, there is an absence of it internally. The circulatory system, with the local form of an animal, may also be reckoned amongst those causes which tend to balance the fat indiscriminately either inside or out. Say that an animal kindly disposed to fatten has a few points that preponderate; for instance, he is large over the sirloin—the blood-vessels, nerves, and muscles of such a part take on a corresponding size. When he begins to have more food given to him, the circulatory system becomes more full of blood, and, as a natural

consequence, the larger parts have a greater influx of blood—thus the growth of these parts either in fat or muscle, and they become of larger proportions, and deposit more fat than those which are not commensurate in vascular action.

Before concluding these remarks, I beg to offer an opinion respecting small lungs, as stated by Dr. Lyon Playfair (at a meeting of the council of the Royal Agricultural Society) that they are more favourable to the formation of fat. Dr. P. says, horses have large lungs. I well know, and not speculatively, that horses, if fed on meal and potatoes, or turnips, quickly and rapidly make fat. In fact, this is the compost that horse dealers use to puff up the farmers' cattle, so as give them a glossy and plump look previous to sale, and the being put to work in this state oftentimes causes their death. On opening them, I have seen them loaded with fat.

Now this is not in accordance with Dr. Playfair's views. My firm conviction is, that animals with small lungs in their growing state will in proportion suffer in their external form. From observations I have made on animals of divers breeds, I have come to the conclusion, that they make fat internally or externally, regularly or irregularly, in accordance with the organization in structural arrangement, linked with those grand principles that modify the external conformation of every animal, locality, clime, and soil; and, lastly, the manner in which beans and acorns harden the flesh of animals. That they do so is an undisputed fact. The hardness of flesh or muscle depends on the richness of its lymph or fibrine. Beans and acorns contain large quantities of vegetable albumen compared with any other food given to horses or cattle. It is on this account, that food which contains a large share of albuminous constituents, when given to horses, cattle, or pigs, makes them develop so great a degree of muscular firmness; but when substances rich in starch, mucilage, gum, or the saccharine principle, are added to beans or acorns, the hardness of the flesh becomes lessened, and the fat more emollient. I have practically proved this with horses. I have given beans and acorns to horses with hay chaff on the farm. The muscular power has been augmented, the flesh feels hard, they work well without fatigue, do not perspire, and, in fact, they are in full vigour. I have altered their diet, and given, instead of chaff, turnips, either the swede or common globe, and the effect is soon visible. The flesh becomes soft and puffy—little work excites perspiration—in fact, the animal is soon reduced from a state of good firm condition to one bordering on debility. From the taking away those substances, beans or acorns, which possess

in a maximum degree the richest albumen, and the supplying those that contain it in the lowest degree, or minimum, the albuminous principle exists in several forms; and by it the living materiality of the animal body is by a law of animal chemistry built, under the guidance of immateriality.—*Veterinarian.*

INQUIRY INTO THE HISTORY OF THE SUBSOIL PLOUGH.

It is a matter of doubt, whether any implement introduced into agriculture ever produced so much sensation as did the subsoil plough on its recent re-introduction by Mr. Smith. It became an object of the utmost notoriety in a very short space of time; its advocates contending that its application would benefit every description of land. On the other hand, men of the most undoubted ability were somewhat incredulous on that point, and experiments instituted under their immediate inspection to test such assertions, satisfied them of the correctness of their previous doubts.

Now, notwithstanding all the attention which has been turned towards that implement, it is too generally believed that Mr. Smith of Deanston, is the inventor of it. Historical data, however, award the credit to an individual whose name appears to have been unrecorded.

The first notice of a subsoil plough that I am aware of, is given by Worlidge in his "*Mystery of Husbandry*," about 170 years ago; and it runs thus: "*An ingenious young man of Kent had two ploughs fastened together very firmly, by the which he ploughed two furrows at once, one under another, and so stirred up the land twelve or fourteen inches deep. It only looseth and lighteneth the land to that depth, but does not bury the upper crust of the ground so deep as is usually done by digging.*"

This seems to have been the *original subsoil plough*. In "*Holt's View of the Agriculture of Lancashire*," published in 1795, we have a nearer approach to the modern implement, which is thus described. "*Another instrument has been lately introduced, which Mr. Eccleston with propriety calls the miner; which is a ploughshare fixed on a strong beam, without mouldboards, and drawn by four horses, and follows in the furrow the plough has just made, and without turning up the substratum penetrates into and loosens the soil from eight to twelve inches deeper than the plough had before gone; which operation, besides draining the land, causes the water to carry with it any vitriolic or other noxious matters.*"

By the substratum thus loosened, the roots of plants may penetrate deeper, and in course of time that which is but a barren substance may become a fertile soil."

In the extracts just given, we have first, a notice of the invention, and, secondly, either an improvement of that invention, or an entirely new implement; and nothing further appears to have been heard of the subsoil plough, till Mr. Smith so successfully brought it into notice. Now, if the chasms in its history could be so filled up as to show the gradual improvement in its mechanism, the names of its improvers, and the extent of its application to agriculture, the information would be extremely interesting. It is in the hope that this may be accomplished by some of your well-informed correspondents, that I have now troubled you. Only about fifty years have elapsed since the implement was introduced into Lancashire, and surely among the long-lived agriculturists of that county, some might still be found who have a recollection of the circumstance.

I am, Sir, yours respectfully,

JNO. BREXETON.

October 18, 1843.

AGRICULTURAL MEETING AT TAMWORTH—SIR R. PEEL'S SPEECH.

The first annual dinner of the Tamworth Farmers' Club took place on Tuesday, the 24th of October, at the Town-hall, Tamworth. It was intended that the dinner should be held in the large hall of Tamworth-castle, but the announcement that Sir R. Peel would preside had created such an extraordinary demand for tickets, that the two large rooms of the Town-hall were fitted up, and, by dint of crowding, upwards of 250 gentlemen sat down to a dinner provided by Rhodes, of the King's Arms Inn. Sir R. Peel, accompanied by Sir G. Murray, arrived at four o'clock. Sir R. Peel was supported on his right by the High Sheriff, J. S. Manly, Esq., and on his left by Sir G. Murray. Among the company present we observed P. Clayton, Esq., M.P.; Sir J. Brenton, Bart.; Captain A'Court, M.P.; W. S. Dugdale, Esq., M.P.; C. N. Newdigate, Esq., M.P.; C. B. Adderley, Esq., M.P.; Right Hon. W. Y. Peel; Professor Buckland; General A'Court; Sir J. Easthope, Bart., M.P.; C. Colville, Esq., M.P.; Colonel Dickenson; Major Bamford; Captain W. Peel; S. P. Wolferston, Esq.; T. Arnold, Esq., Mayor of Tamworth; F. Twemlow, Esq.; Rev. A. B. Evans, D.D.;

Rev. R. Taylor; Rev. H. Woolley; C. Forster, Esq., late M.P. for Walsall; R. W. Peel, Esq.; Captain Dyott, H. I. Pye and E. Peel, Esqrs., vice-presidents of the Tamworth Farmers' Club; F. Willington, Esq., secretary; J. Webster, Esq., and almost all the members of the club.

The usual loyal toasts having been drunk,

Sir R. Peel said,—Gentlemen, the toast which stands next upon the paper is “Prosperity to the Tamworth Farmers' Club.” I believe it is usual, on occasions of this kind, for those who occupy the post which I occupy this evening—standing in the situation of patron of the club, and also being president of this meeting, to preface a toast of this nature with some observations. And you probably expect that I shall follow the example of those who have preceded me. Gentlemen, I should be sorry to disappoint these expectations; but, at the same time, I entreat of you to bear in mind that it is one of the fundamental rules of this society, that all topics having a tendency to create party hostility, or to introduce political discussion, are studiously excluded; you may depend upon it that by me that rule shall not be violated. Gentlemen, this room has resounded with party speeches and party exultation, and no doubt it will so resound again. The successful candidates meet here to congratulate their friends on their victory, and the defeated candidates meet here with their friends to account for their defeat, and to encourage better hopes for the future; but to-night both candidates and their political partisans may meet with perfect harmony, and may be assured that nothing will be said to arouse any remembrance of party strife. Nay, gentlemen, I will go further, and deliver it as my opinion, that the more your speeches are of a practical character—the more they relate to the particular subject that brings us together—the better will it be for the interests of this society; and if in the course of this evening any man will deliver two sentences giving information upon subjects connected with agriculture, or stimulating inquiry, he will render a greater service than if he delivered the most elaborate panegyric upon the club or upon agriculture generally. Gentlemen, we are a farmers' club—we are not a society for the protection of agriculture—we have nothing to do with any of the questions relating to agriculture which agitate the public mind and divide public opinion. We are a club for the promotion of the science of agriculture. What we want is, to learn how, in the shortest time, and at the least expense, to produce the greatest quantity of food for the consumption of man and other animals, without permanent injury to the land. Gentlemen, I know not how

skill in agriculture can be obtained, except in three ways—either by practical experience as agriculturists from having followed the profession of a farmer, by acute and extended observations; or by reading the treatises written upon agriculture, which is another mode; and the third is, by mutual communication, by conversation, by asking questions, by having doubts solved, by comparing the result of experiments and receiving mutual information. Gentlemen, I should be the last man to undervalue practical experience. If it is founded upon very extensive observations, it is of the utmost value; but depend upon it, the *British farmer is exposed to a competition which will make the mere reliance upon a limited practical experience a very imperfect resource.* If a man's experience be confined to his own district—if he has no opportunity of comparing his method of agriculture with the method of other districts of the country—if he takes it for granted that because he has been for 40 or 50 years employed as a farmer—if he takes it for granted that if he pursues the method followed by his father before him he will therefore prosper; and if he believes that practical experience is all that is necessary to ensure success, depend upon it he will be disappointed. It is impossible for any one to travel 10 miles through the country—it is impossible for a man to go out of his own parish, without seeing that the mere reliance upon personal experience will not ensure success. You see different degrees of fertility upon lands of equal natural strength—you see the land cultivated by a farmer having merely the advantages of personal experience, and that of another introducing improved methods of cultivation, producing the greatest difference in the results; where one brings to bear the advantages of chemical and geological science, while the other brings only the result of his own practical experience and personal observation. Another mode is by having access to books, and having opportunities of reading. Gentlemen, these opportunities are afforded within this town, for a library has been established, to which every farmer can obtain access by the payment of a most moderate sum, not more than 1s. a quarter, and by that payment every farmer in this district can have access to the library founded in this town, can take home books and make reference to them, and that library contains more than 100 volumes of treatises of various kinds connected with agriculture. Another mode by which agricultural knowledge may be promoted and extended (and I doubt whether it will not be found the most effectual mode), will be by meetings and societies of this kind. Not by meeting to listen to eloquent speeches, but for the purpose, on the part of the farmers, of conducting discussions upon particular

points, by asking questions, having doubts solved, rubbing, as it were, each other's minds against each other, and thus communicating and receiving knowledge. These clubs afford you, if you belong to them (for the sum of 5s. entrance and 1s. per quarter), an opportunity of being present at discussions and taking a part in them, suggesting questions for investigation and discussion; and, depend upon it, if you avail yourselves of the opportunity thus afforded you, in addition to your own practical experience, of deriving increased knowledge from books, and also of deriving knowledge from communication with each other, by communicating to each other the results of your own experiments and your own personal observation, there will be, in my opinion, the opportunity offered of greatly promoting and encouraging agriculture within this kingdom. This meeting is composed chiefly of landlords and tenants. I see around me here many landlords and possessors of extensive estates in this district, and there are many such belonging to this club, who, if not in the capacity of owners of the soil, are, at least, good practical farmers, who derive a profit from the cultivation of the land; and, as an example, I may name my valued friend, Sir F. Lawley, the president of the club. I do not unite these capacities; I am a landlord, but I cannot say that I am a practical farmer, deriving profit from the cultivation of the soil. Still, I hold land, and it becomes me and other landlords who have not the means of affording information to their tenants from their own successful pursuit of agriculture, it behoves us to consider in what way we can contribute to the advancement of agriculture. Although we know little about it, yet, living in these agricultural districts and coming frequently into communication with the farmers, my opinion is, that the landlords may greatly contribute to the promotion and advancement of agriculture. Take, for instance, the breeding and improvement of stock. Gentlemen, I speak for myself, when I say that improvement begins at home. The relation of landlord and tenant is definite and well understood, and, speaking with reference to my own tenantry, I wish to see the whole district prosperous, but I naturally wish, in the first instance, to see my own tenants prosperous. I state here, in the presence of many of my own tenants, that I am willing to do everything I can for the improvement of their stock; and if a committee of the most intelligent of them will go to Birmingham, the great metropolis of this part of the country—if they will go and ascertain what is the best description of stock, and what is the greatest demand—if they will determine what description of stock derives the greatest improvement in point of fattening or the greatest quantity of

milk from being fed upon the pastures of this district, I will, regardless of the expense, introduce the best animals—the best bull, for instance—and will give the opportunity to my tenants to improve the breed upon my estate. Gentlemen, that is one mode in which I—although little conversant with agriculture, but as a landlord deeply interested in the promotion of its prosperity—can contribute to the advancement of those in whose prosperity I am interested. With respect to experiments, I believe nothing is more bewildering to the practical farmer than the different results of the experiments that have been lately made with artificial manure, natural manure, and patent manure; in fact, the tenant hardly knows what to do, from the result of a series of conflicting experiments, and cannot tell whether they do not owe their success to situation and soil: he is doubtful whether the experiments have been fairly made, and whether the party making them is not prejudiced in favour of any particular manure, and have unconsciously given it some advantage over the others. Now we landlords, although knowing little of agriculture, have the opportunity of benefiting our tenants by taking the course which I am prepared to take, namely, to make experiments and exhibit the results. Let us take this artificial manure, and let our tenants state their doubts on the subject; but if the landlord will go to the expense of devoting a portion of his farm to the experiment, if he will purchase the manure, apply it with perfect fairness, and exhibit the result to his tenantry, then they will have a greater confidence in determining whether they will go to the expense of purchasing it, and they will have greater confidence in the results of its application. You remember, gentlemen, that I set out by observing that practical observations were more important than elaborate speeches, and to follow up this remark, I shall state to you that I desired a friend of mine, who I knew had carefully made experiments with a manure which has been lately introduced, and the merits of which you must all be in some degree familiar with—I mean guano—I desired him to make the experiments with care and fairness, and to communicate results to me. It was as follows:—“On a field of two acres, planted with potatoes, the result of manuring the ground with guano, Potter’s manure, and stable manure, was as follows—guano, 15 bushels; Potter’s manure, 11 bushels; and stable manure, 9 bushels. The ridges in which the potatoes were grown were of the same length; the potatoes were of the same quality, and the produce of the several ridges having been taken up and measured, the average result was that above stated.” The following details will make the information more complete—“The guano

and Potter's manure (which is made in London) were each mixed with wood-ashes and fine mould in the proportion of 1 bushel of guano, or Potter's manure, to 6 bushels of ashes, &c. A bushel of guano weighs about 85 lb. Three bushels of guano, and 3 bushels of Potter's manure, making 510 lb., were put in two ridges at two different times, being at the rate of 3 cwt. per acre, each of these manures costing 14s. per cwt. Half of each was put into the ridges when the potatoes were planted and the other half when the potatoes were appearing about an inch out of the ground, covering in the guano and Potter, by hoeing and raising the ridges. The potatoes were planted the 4th of April, and taken up early in October. The produce exceeded 600 bushels, the field having been previously exhausted and in very bad order. The total expense, including every charge, was £16, and at 1s. a bushel the profit on the two acres was £14. The value of the land was about £1 per acre if let. I tried the Potter and guano manures in grass upland. When there was no manure the produce was nearly double, and an increase of about one-third as compared with stable manure, which was put on the land late. On the grass land the guano and Potter's manure were nearly equal in their effects. "This trial was not so satisfactory, as the stable manure had been put on too late. I paid 14s. a cwt. for each of these artificial manures. The price I understand is now 12s. a cwt." Now, that was the result of the experiments, and I believe they were made with perfect fairness. At the same time I don't blame you, who have heard that stable manure will produce similar results. I cannot ask you to go to this expense, but I am prepared to do it, and I shall be ready to devote a portion of my land to the experiment, under the superintendence of a committee—to have the produce taken out at the proper season, and to test the result. So also with respect to the other descriptions of manure; and if the landlord will devote a portion of the land he holds to different experiments—say, six half-acres—in the mode pointed out by his tenants, that is a mode in which the landlord, although not practically acquainted with agriculture, may, in my opinion, render important service. 'Gentlemen, on a late occasion, in a neighbouring city, I took the opportunity, in speaking on the subject of leases, to observe that the habit of the country was adverse to the practice of granting leases; but that if any tenants of mine felt that their position would be raised and their confidence in the security of their tenure would be increased by it and were to apply to me for an extension of the term now granted as an additional security for the outlay and application of their capital, that I would be disposed to give a favourable consideration to

such an application. Gentlemen, I make the same declaration now in the presence of many who occupy land from me—and that is not an empty declaration, because, in the only application made to me I have granted a lease. The land was out of order, and the application was made to me by a new tenant, who contemplated improvements, and had capital to expend, which I think every landlord has a right to require. He said, "I am a stranger to you, and with every confidence in your declaration, I would rather have a lease." I granted him a lease for 19 years—the first 7 at a reduced rent, and the remaining 12 at the rent paid by the former tenant. That was the only application made to me for a lease, and to that I have acceded. Now, gentlemen, there is another subject which I think it right to advert to—there is another case in which the landlord has the opportunity, although he may know nothing of agriculture, to benefit the occupying tenant—I allude to game. There are few more eager sportsmen than I have been and am, but seeing the competition to which I am convinced the farmers of this country are exposed and must look forward to, I consider it to be the duty of every landlord to make some sacrifice of his personal pleasure, to enable the tenant to meet that competition. Gentlemen, I believe that the damage done by the abundance of game is chiefly committed by hares and rabbits. I do not believe that the occupier of the land sustains much injury from partridges or pheasants—the chief damage is done by hares and rabbits. I have no hesitation in saying that I shall be pleased that there is not one single rabbit on the whole of my property, and that I shall do everything in my power for their destruction; and with respect to hares, I shall willingly forego the gratification of my sport; and if a tenant informs me that they exist in such quantities as to do him serious damage, I shall be perfectly ready to give orders for their immediate destruction, and reduce them to such an extent as will satisfy him that no injury can be sustained. I earnestly hope that those here present, in the situation of occupying tenants, and those others throughout the district, who may not be within these walls, will seriously consider whether or no advantage may not be derived from becoming members of this institution. Let us all, landlords and tenants, meet together within this district for the promotion of the object this society has in view—the improvement of agriculture. It is a noble pursuit, and we shall be amply repaid by our success in the cultivation of the land. Gentlemen, we have no excuse for being behindhand in the great race of agricultural rivalry. This part of the country has been formed by nature for the development of agricultural improvement. It has not

been brought recently under cultivation by the application of skill and capital overcoming the obstacles of an unfavourable soil. From the earliest period this particular district has been celebrated for its fertility. It was in very remote times the chosen seat of the Mercian kings, on account of its beauty and fertility; and in the history, written by an ancestor of my hon. friend the member for Warwickshire, Mr. Dugdale, that distinguished individual, in writing the History of Warwickshire, dwells almost with enthusiasm, although it was a mere statistical history of the county, upon the natural advantages of this particular locality and its neighbourhood. He says, that at a period now removed from us by an interval of 1000 years, as early as the ninth century, it was the chosen seat in Saxon times of the Mercian king, and no one who can look upon that district, who sees its extent of woodland, the delightful rivers which water it, enriching the spacious meadows that border them, the extensive champagne country forming a district the most valuable for cultivation, either for profit or pleasure—no one who sees that can be surprised that in the earliest times it was the chosen seat of the sovereigns of this country. Therefore, gentlemen, in this favoured locality we have no excuse for being behindhand in the race of agricultural prosperity. Another advantage we possess is, that we live in the neighbourhood of a great manufacturing district, and you all know of what importance Birmingham and the great iron district in its neighbourhood are—you know also what influence it has in the demand for your agricultural produce, and you have had ample experience that with the decay or increase of the prosperity of that district there are corresponding sympathies on the part of the agriculturists. Thus, you have not only a county formed by nature, but possessing the advantage of a great manufacturing district in its immediate neighbourhood, and creating a market for its produce. Then, gentlemen, let us observe the progress made in less favoured districts. Depend upon it, there is room for great improvement here. I wish to pass no reflection whatever upon your skill, your industry, or your enterprise, but I should not be that true friend to you which I am, if I did not state my implicit belief that there is the opportunity for great improvement; that there are other districts of the country not more favoured, where greater improvements in agriculture have taken place, and the example of which might be profitably followed here; and it is from institutions and societies like this, which bring to bear the observations and experience derived from other districts, that I anticipate benefit for this locality, and that is the reason that has induced me to co-operate in the formation of this society. Let

us then co-operate together. It was the dying bequest of a wise man to his sons, that if they dug the ground they would find a great treasure. They did dig, and they were not rewarded by the discovery of the treasure in the bowels of the earth, but they were rewarded by a treasure upon the surface, by the increased produce flowing from increased cultivation. And so it will be with us. You will learn by the lessons of experience—you will profit by the improvements of other districts; and, depend upon it, by increasing the prosperity and produce you will entitle yourselves to that credit which belongs to the benefactor, as he is justly called, of his country, who makes two blades of corn to grow in that place where only one blade grew before. But we shall have an admirable harvest; we shall not only derive pecuniary gain, but by meeting frequently together—by landlord and tenant being brought face to face, without the intervention of agents—by learning each other's character and ascertaining each other's wants, we shall not only improve the cultivation of the soil, and increase its produce, but we shall also promote and improve those kindly feelings between landlord and tenant which soften the gradations of society, which diminish the interval between wealth and poverty, and we shall strengthen and fortify the bond which we already have in a common interest in the prosperity of the soil, by feelings of reciprocal attachment and reciprocal respect, and we shall thus derive the double reward of benefiting ourselves in a pecuniary point of view, and in presenting to the country a happy district, inhabited by liberal and considerate landlords, by intelligent and improving tenants, and by a happy and contented peasantry. That this may be the result of our labours, humble as they are, and in a limited sphere, is my earnest prayer, and I call upon you to prove your participation in my sentiments, by drinking—"Prosperity to the Tamworth Farmers' Club" with the utmost cordiality and three times three.

Mr. Dugdale, M.P., proposed the next toast. He believed that they were all of one mind as to the value of farmers' clubs, which had been so well described in the speech of his right honourable friend. He (Mr. Dugdale) was a farmer himself, and he had always considered it his duty, as a resident gentleman, to promote as much as possible the agricultural interest. He had gone to considerable expense in the purchase of stock of the first quality, and had devoted it to the improvement of the stock in this neighbourhood. He feared, however, that the fault of the farmers in that district was, that they paid too much attention to their stock, and too little to the improvement of the soil. Among

other points, he thought they made a great mistake in not having their manure in the neighbourhood of the house as well as in the farm-yard. He had made considerable alterations in his house, by which all the scourings of it were collected in one large tank, and from thence spread over the land. These and many other points were well worthy of their consideration, and nowhere could they be so well considered as in societies like the present. He would conclude by proposing to their attention, "The health of the patron of that society, their worthy chairman, Sir R. Peel."

Sir R. Peel acknowledged the compliment, and gave "The High-Sheriff."

The High-Sheriff (Mr. Manly) returned thanks, and proposed "The health of Sir F. Lawley," which was received with much cheering.

Mr. Pye then proposed "The health of Mr. William Yates Peel." The capacity in which he proposed Mr. Peel's health was, as the founder of the Tamworth Farmers' Club. Mr. Peel, though much afflicted with gout, had exerted himself strenuously in the formation of the society, and so great was his zeal, that the first meeting of the committee was held in his bed-room.

Mr. W. Y. Peel said, as one deeply interested in the agriculture of the county he had assisted in the formation of the Tamworth Farmers' Club, but he had also received much assistance from those kind friends who had consented to take office in the association. He had prevailed on his right honourable relative to become its patron, and, being so, he trusted there would be no necessity for alteration. He (Mr. Peel) was no advocate for annual, biennial, or triennial officials. It was not the want of good farmers in the neighbourhood of Tamworth that had called for the club; they had many good farmers, he saw many in that room, but no one could deny that there was always some room for improvement. It was said by those unfriendly to the formation of farmers' clubs, that the proprietors of land fostered them with a view to their own interest. Now he solemnly declared that he did not believe that to be the case. He believed that the owners of land were not only anxious to benefit all those engaged in agricultural pursuits, but also every other class of the community. Of this he felt sure, that there could be no real enjoyment in the possession of land unless the proprietor left to the cultivator a fair remuneration for his time, skill, and capital. No man could derive pleasure from residing on his property if even the agricultural labourer was not employed, and at such wages, too, as would enable him to support his family and himself in comfort. Mr. Peel concluded by again thanking the meeting for the honour they had done him.

Sir R. Peel.—I beg leave now to propose to you a toast which does not appear in the list prepared by the committee, and for the reason simply, that they did not expect the presence of the distinguished individual who is the subject of the toast. Gentlemen, I propose to you the health of one who has devoted his great ability—his great intellectual attainments—to the promotion of scientific agriculture,—I mean our distinguished guest, Dr. Buckland. There is no quarter of the civilized world, where knowledge has made progress, in which the name of Dr. Buckland is not held in deserved respect, and his own countrymen will, I am sure, feel it an honour that he attends the first meeting of the Tamworth Farmers' Club. I shall couple with his name all the illustrious men who have co-operated with him in his scientific researches. Dr. Buckland has lately been in Lincolnshire, and I am sure the best return he can make for the enthusiasm with which you will receive his health will be, to give you some details of the facts which he met with in the course of his journey. To encourage him I now propose his health, with three times three and loud cheers.

Professor Buckland on rising was loudly cheered. For himself and for his fellow-labourers in the field science, who had endeavoured to exert themselves, as far as in their power lay, to contribute to the improvement of agriculture, they would allow him to return his most grateful and fervent thanks. He might assume, he trusted, on the present occasion, that they were thoroughly convinced by what had fallen that day from their distinguished chairman, and from what, on a recent occasion had also fallen from his eloquent lips at an agricultural meeting in an adjoining town, of the importance to all agriculturists of considering that there was vast room for improvement even amongst those who, in their own localities, considered themselves to have attained the highest point of perfection. It was one of the advantages of meetings like the present, that they found out their own imperfections by the comparison of their practice with the better practice, not of their neighbours, but of their distant fellow-labourers in the same field—the field of scientific agriculture, and the cultivation of the earth, as it was now carried on upon scientific principles. He would assume also, that there was no person present at that meeting who was not convinced of the truth of the dogma which was now accepted as being the basis of all agricultural improvement, that it was totally useless to attempt any experiment in the hope of improving lands which were not by nature dry, until they had drained them. It must be well known to many individuals present, what had been the result of experiments performed in

their own immediate neighbourhood of Drayton Manor, where a small field of the worst, most worthless, and wettest description, had been brought by draining, only three years ago, to produce a result in one year only which was recorded in the Transactions of the Royal English Agricultural Society. That field the first year produced 23 tons of turnips; whereas, but the year before, it produced only one single ton of bad and worthless hay. It must be obvious to many who had the advantages which he had not hitherto possessed, but which he hoped shortly to enjoy, of seeing the splendid improvements which he heard, from the best authority, had been made by Lord Hatherton in an adjoining district—what wonderful effects had been produced by thorough draining, properly carried on, as it had been with such splendid success by that distinguished nobleman and agriculturist. They might also recollect the observations to the point that fell from the lips of Lord Stanley, as a result of his practical experience, at a late meeting at Liverpool. That noble lord, by his successful experiments, had set an example in a neighbourhood which of all places in the kingdom most required it. He alluded to the neighbourhood of Knowsley, and the district of Lancashire to the north of Manchester, and between Preston and Lancaster. Of all the fertile fields bestowed by the Creator, and left in a state of slovenliness by man, those fields for miles and leagues were the worst. Not so was it in the more southern parts of the empire, now that the great reviver of the system of draining, Mr. Smith, of Deanston, had established himself in the metropolis as a consulting agriculturist, ready to give his aid to restore fertility to those lands which were now sterile, simply because no means had been adopted to remove the water which fell from the heavens, or sprung from out of the bowels of the earth. The mention of the earth reminded him of a subject to which to a peculiar degree he had devoted his attention for many years. Had time permitted, he could have entered into many subjects connected with the earth, of the highest interest to agriculturists; but he would only now advert to the remarkable provisions which appeared to have been made in the act of its creation for the benefit of those who in future times were to be employed in the cultivation of its surfaces. He would scarcely allude to the provision of the metals; to the provision of that gold and silver which was the ultimatum of all agricultural pursuits; to that provision of iron which was ten thousand times more valuable than gold and silver, and without which not one of these agricultural implements could have been forged, and they would have been reduced to the condition of the Esquimaux and Indians, who were com-

pelled to avail themselves of the teeth of sharks and of the bones of fishes, as the only instruments by which they could capture their prey. They saw in the dispersion of this iron, an article of such universal necessity to all mankind, a providential foresight, laying up a store for the wants of man in every position of the civilized globe. This same foresight they might further see in the preparation of the great earth itself—in the composition of rocks, which consisted of the elements of flint, of clay, and of lime, forming thus a provision for that superficies which it was the intended and allotted duty of a large proportion of the race of mankind to cultivate. But the surface of the soil itself was that which more immediately demanded their present attention. That surface, the origin of which he had briefly alluded to, now daily in its cultivation displayed new wonders—wonders almost equal to those disclosed by geology. In the course of the last 14 days he had seen wonders performed on the surface of the soil, such as he had never seen before. It was no wonder to see that land which the hand of God had made fertile continue fertile till it was unfertilized by the carelessness of those who ought to be its cultivators. He regretted, indeed, to say, that in the most rich and fertile lands of this country he found the agriculture most slovenly, and the condition of the agriculturist the most miserable. On those rich lands in the neighbourhood of Bridgewater, which had produced and would produce for 30 years successively, 30 or 40 bushels of wheat, the farmers were most careless and neglectful; and the grazier there bought his ox, turned it into the marsh land, and visited it no more until he turned it out to the butcher. It was not in that region that they were to look for agricultural improvement, but to those sterile and barren districts which, until a few years past, produced nothing. He had lately witnessed in two districts of Lincolnshire effects resulting from agricultural science which he could not have believed had he not seen it. They were districts far removed from common observation, in the Wolds, as they were called—meaning the wealds or wilds of Lincolnshire, a term expressive of their natural sterility—in those Wolds which, in the beginning of the present century, Young, in his *Agricultural Tour*, described as a country covered with furze bushes. “Lord Yarborough,” said Young, “was an excellent landlord, and he wished him no more harm than that he should be thrown from his hunter into the middle of one of those furze bushes, for a little pricking would do him a deal of good, and would tend much to the benefit of that part of the country.” That same Lord Yarborough lived to plant 4000 acres of trees, which had now attained a height of

from 50 to 60 feet; and, what was more important, he lived to bring into existence a race of tenantry, now the glory of the country—tenants who occupied from 500 to 1000 acres of land each. Land, which 30 years ago was covered with furze bushes, and not worth 5s. an acre, now produced 25s. an acre. The rent of that land had increased five-fold, whilst the wealth of the tenantry had augmented in the same proportion. Every farmer whom he had visited possessed the finest hunters. Many have carriages. Some whom he did not visit had hothouses and pineries, and yet, whilst this was the situation of the tenantry, the landlord had benefited five-fold. But, what was better than all, was the condition of the labourers. He had never heard of such labourers—£38 a year for wages—all of them kept a pig—a cow was kept for each—and they were compelled to eat meat three times a day. Those who have visited Lincolnshire must have witnessed the beautiful architecture with which every village of that county was adorned. Such churches and such steeples; displaying more exquisite taste and skill than was to be found in any other part of the country. But lofty and beautiful as were those churches, they were, for the most part, out-rivalled in height by the ricks which presented themselves everywhere. Such ricks—streets of ricks—acres of ricks, disposed in rows. Near Lord Yarborough's house there were streets of ricks as long as the longest street in Tamworth, streets longer than the length of the Parthenon, at Birmingham, and all from land which, 35 years ago, was not worth 5s. an acre. And what became of all this abundant produce? It went to the manufacturing districts to be disposed of. But there was another district in the vicinity of the metropolis of a county, not five miles from the town of Lincoln, in the midst of which stood a column, bearing this inscription—"Columnam hanc Utilitate Publica D. D. D. F. Dashwood, MDCCLI." In 1751 that column was erected in the centre of a desert, to guide the traveller in the midst of a howling wilderness: On that place might now be seen hayricks standing together in rows, almost like the squares in London. It was, in fact, a city of hayricks. There were there also the remains of an asylum of the Knights Templars. There lived there now a farmer, 70 years of age, who in 30 years had realised a fortune of £60,000. They might ask him (Dr. Buckland) how these results had been produced. They had been produced by a judicious application of capital, and of the good sense which was the characteristic of the farmers of England. The present proprietor of the Templar's Asylum imported ship loads of bones and oil cake to be ground for his farm. The cattle ate the straw, and produced that

manure which was the foundation of all the success of the crops upon his farm. The next example to which he would call their attention was one more to the purpose. It was the example of Mr. Coke (the Earl of Leicester) and the Duke of Bedford, who had produced such favourable changes in the agriculture of the eastern part of the country. He found, however, that the farmers in the neighbourhood of Tamworth approximated nearer to those of Somersetshire than of Lincoln; and he protested that between Hampton and Tamworth he had seen more thistles in one field than he had seen in the whole of Lincolnshire. He trusted that the influence of that society would put to shame the man who was the occupier of that field. He would advise them to go and see the farm of Lord Ducie, near Bristol, admirably cultivated as it was under the care of Mr. Morton. The first thing done there was to drain the marsh, and thorough drain the small fragments of land. The farm, he should say, was commenced in a marsh, and consisted of 200 acres. It now produced 40 ricks, and required a railroad to carry the corn to the barn and thrashing-mill, which was worked by the same engine as that used for the railroad. The whole surface of the land was covered with artificial crops, and there was not one blade of natural hay to be seen. The great principle on which the farm was cultivated was, that it should be self-supported, and that not one farthing should be spent in money for any foreign purpose. Of course it was impossible for them to bring their farms at once to a state of perfection. They must at first make use of foreign manures, but in a short time they would arrive at the self-supporting system. They must not forget that the dunghill was the farmer's greatest treasure. There was a proverb in Scotland that—"The midden makes the meal ark,"—which meant that the dunghill was literally the produce of everything. They must, however, sell nothing but grain and flesh. They must cherish that midden as their first-born child, give it plenty of sugar and pap—"Sugar and spice, and all that's nice." They must take care that the valuable ammoniacal vapours were not, as too commonly is the case, lost, but that they should be covered over with a coat of earth. This system might, he thought, be applied almost universally in that county. He saw no possible objection to it. As to their general object, he was sure that the support which it had received, and the example set by influential individuals in that neighbourhood, were such as to ensure success. The examples of such men as Lord Hatherton, as their Right Honourable President, and others, spoke volumes in its favour, far more than could any recommendation from himself, who had only to apologise for the length at which he had spoken, and to recom-

mend them, as the best mode of ensuring prosperity, to follow the example of those distinguished agriculturists to whom he had alluded.

Mr. W. Yates Peel proposed—"The health of Mr. Edmund Peel and Mr. Pye, the vice-presidents." The former gentleman was the founder of their club. Several other speeches were delivered in the course of the evening.

MANAGEMENT OF PARISH ROADS.

SIR,

It will be admitted that good roads are of the first importance to agriculture, notwithstanding the legislation which regulates the making, repairing, and cleaning them, is very defective. The hamlet I live in, is, I suppose, an example of what takes place in other parts of the kingdom; we have not very extensive roads to repair, yet those we have are left in a very bad state. The business seems to be one of discretion with the surveyor in office; for had we a man of influence who lived in our neighbourhood, who wanted to have a road that led to his house improved, he would probably get himself appointed surveyor, and rates would be called for, which seems to make the expenditure on parish roads and the manner of doing the work, more a matter of chance than a rule; consequently the laws must be defective in principle, and beneficial ends are not accomplished to the extent which the economy of society admits of. It appears that to approximate to a more rational system—first, that parishes should have their roads and rights of way mapped and measured; next, that magistrates of the hundreds should settle annually what amount of money was to be expended by each parish on its roads; then, that the parishioners, with the aid of professional advice, should settle what was to be done, and the manner in which it was to be performed, and that cleansing and removing nuisances should be considered as part of the surveyor's and parishioners' work; which regulations would bring intelligence and influence into operation in a duty which now often rests with an incompetent individual.

Then would it not be more rational that parishes should only be answerable for the outlay on their roads of a quota of money annually prescribed by magistrates, than to be liable to the expensive and operose law of indictment?

There are doubtless some parts of roads^o that very much call for improvement that cannot be undertaken for want of money and legal

authority. What objection could there be of giving parishes, under certain regulations, power to borrow money on terminable annuities for that purpose, as improving a line of road would be an advantage for those who come after us as well as ourselves, and it is but fair they should pay part of the cost? And the same rule applies to the outlay of money on making bridges, schools, lunatic asylums, public wells, water-pools, &c., &c.

I am, Sir, your obedient servant,

CADOGAN WILLIAMS.

BRIDGEEND, Nov. 8, 1843.

ON THE FOOD OF PLANTS.

By CUTHBERT W. JOHNSON, Esq., F.R.S.

The examination of the chemical phenomena of vegetation is now exciting (fortunately for practical agriculture) no inconsiderable attention. There is, in fact, a rapidly increasing conviction diffusing amongst farmers, that science has done, and will yet accomplish far greater things for the cultivator than our ancestors were wont to regard as possible. The mere existence of this feeling is sure to be productive of good results; for hence scientific experiments of all kinds are multiplying around us. "Science with practice," is a matter rapidly becoming more generally understood; and, even while I am writing, I remark with much pleasure upon the successful efforts by the farmers and landowners of Scotland to establish by subscription a professorship of agricultural chemistry. Let us, therefore, by way of affording some slight assistance to so good a cause, examine a few of the facts which the chemist has ascertained with regard to the food of plants.

Hardly any chemical research can be more interesting to the farmer than such an enquiry. It is one, however, that has only within the last half century been examined with that patient spirit of experimental enquiry which is the true source of knowledge. Not but that from very early periods there were certain vague surmises, as to "the four elements," of which all vegetables were supposed to be formed. And even when chemistry was becoming a science, Van Helmont, a celebrated German philosopher, by his experiment on a willow tree, whose

soil, enclosed in an earthen vessel, he for a considerable period moistened only with rain water, endeavoured to prove that water, and water only, is the true food of plants. But when succeeding more accurate chemists found, that the water which he employed contained several, by him unsuspected, impurities, his celebrated experiment was then discovered to be utterly inconclusive; since the increased weight of the willow tree was fully accounted for by the greater weight of the earthy and other impurities of the water. And the same fate which attended Van Helmont's theory has been since his days shared by all those who, by inaccurate experiments have endeavoured to generalize upon these, and other more difficult vegetable mysteries. Thus, it has been in vain attempted to be shown, that the earths contained in plants are *formed* by them during their growth; but all such dreams need not disturb the researches of the intelligent farmer. He must rather conclude it to be an established fact, in investigating the subject of this essay, that every particle of food required by the vegetable is derived from either the earth, from water, or from the atmosphere; that not a single element which his crops contain (and these are far less in number than is generally supposed) has been formed by the plant; but that all that the vegetable performs is, to combine certain simple elements, or to absorb particular compound substances, and unite them with others, so as in either case to form new substances, and, probably, to decompose certain of those compounds from whence such elements can be derived. To give a familiar instance. It has been long known that plants have the power of absorbing from the atmosphere carbonic acid gas (an acid composed of carbon, 72·73 parts, and oxygene 27·27 parts), and with the carbon of that acid, united to other substances, it forms a variety of vegetable matters, such as starch, gluten, sugar, woody fibre, &c.; but the carbon of which that carbonic acid is composed it has no more power of forming, than it has of creating the lime, or any other earth which it absorbs from the soil.

It will be found on the chemical examination of a plant, that it is chiefly composed of carbon, oxygene, hydrogen, and nitrogen, united with certain earths, such as lime, magnesia, and alumina (clay), the metallic oxides of iron and manganese, and several salts, such as those which have for their base the alkali, potash, and the earth, lime, and a few others. These last, however, usually form the smallest portions of the plant: thus, 1000 parts of the seeds of wheat only yield when burnt about 33 parts of ashes that are earthy, metallic, or saline substances; the remainder being gaseous or aqueous matters, which are

driven off by combustion. There is little reason to doubt but that all these substances found in vegetables must either be in solution or in the gaseous state, before they can be absorbed by the plant. Every attempt which has been made to enable vegetables to absorb perfectly dry, or merely mechanically suspended substances has entirely failed. We must conclude, therefore, that it is in only one or other of these forms that the food of plants is available.

Now, this being understood, let us next examine how these solid, soluble, or gaseous substances are supplied to the plant. And, first, let us consider the mode in which the earths are absorbed by plants. The earths found in vegetables are four—lime, magnesia, alumina, and silica. In very remote periods it was noticed that various earthy matters were obtained by the combustion of plants; and some of the Greek philosophers considered these as the principle of fixity, of hardness, and of solidity, and from the rude way in which vegetable substances were long examined, by merely burning them, and collecting their ashes, little more could be collected from such an examination than the ordinary gases produced by combustion, and the residuary matters of the plant. The labours of modern chemists have shown with more accuracy, not only that earthy matters, but that *different* earths exist in plants; that, in fact, there are few plants in which they do not exist. Thus, to give only one or two instances:—Two pounds of the seeds of wheat commonly contain of

	<i>Grains.</i>
Silica	13·2
Carbonate of lime	12·6
Carbonate of magnesia	13·4
Alumina	0·6

Silica abounds in the *straw* of wheat to such an extent, that, before the blowpipe, the ashes of this straw combine with its potash, and form a glass. And it is contained in the Dutch rush in a proportion sufficiently copious to polish wood, bone, and even brass. It is, in fact, employed by the turners for this purpose. The epidermis of the wheat plant contains 6·5 per cent; that of the common reed, 48·1 per cent; that of the bonnet cane 90 per cent of this earth: for, as an earth, it is, perhaps, the best still to consider it in this place, although modern chemists class it with the acids.

Lime, combined with the carbonic, or other acid, is still more commonly present in vegetables than silica, yet not in such large proportions as in some of the instances I have given of the presence of that earth;

thus, the ashes of the straw of wheat contain 1 per cent of this earth; that of the chaff of barley 12 per cent; the wood of the oak 32 per cent.

Magnesia, in the state of carbonate of magnesia, is also generally diffused throughout vegetable substances. In two pounds of the seeds of wheat, there are 13·4 grains of this earthy salt; in those of rye, 14·2 grains; in barley, 25·3 grains: in oats, 33·09 grains.

Alumina is the less commonly present in plants of all the earths, and in the smallest proportions; thus, in two pounds weight of the seed of wheat were found only $\frac{6}{100}$ of a grain of alumina; in the same weight of those of rye, $1\frac{4}{10}$ grains; in barley, $4\frac{9}{10}$ grains; and in oats, $4\frac{1}{2}$ grains. It is, however, contained in rather a larger proportion in wormwood, and a few other plants.

Now these earths, there is little reason to doubt, are absorbed by the plant in a state of solution; that is, dissolved in the moisture of the soil. We know that both the carbonates of lime and magnesia, and silica, are soluble in water; and it is probable that the alumina is absorbed in combination with some acid—thus forming a soluble salt of alumina.

The earths, then, must be regarded as the direct food and constituents of plants; and, not only do they thus afford the direct constituents of the farmer's commonly cultivated crops, but they assist very essentially their growth in several ways; for, saying nothing of the mechanical assistance they afford in supporting the plant, and the medium they present for the reception and gradual decomposition of organic manures, they afford indirectly food to his crops in another most important way, by their absorption and retention of the moisture of the atmosphere. This absorption of the insensible moisture of the atmosphere by the earths of the soil is much more considerable in amount than is usually supposed. In my own experiments to ascertain the comparative power in this respect of several very commonly present substances, I found that 1000 parts of lime, previously dried in a temperature of 212°, absorbed by exposure to air saturated with moisture, and of the temperature of 62°, 11 parts; 1000 parts of chalk under similar circumstances gained 4 parts; and 1000 parts of burnt clay 29 parts. Davy found 1000 parts of a coarse sand gained 8 parts.

Pure silicious sand, however, does not absorb any portion whatever of moisture. Calcareous sand gains, however, in 12 hours 2 parts; loamy clay, 25 parts; stiff clay, 30 parts; magnesia, 69 parts; garden mould, 35 parts; arable soil, 16 parts of atmospheric moisture. These

chemical truths will illustrate the great advantages derived by the cultivator from deepening and finely pulverizing the soil, so as to facilitate, not only the access to the roots of the growing plant of the atmospheric gases, but of the aqueous particles which they always contain.

The earths, therefore, must certainly be regarded, not only as the direct food of plants, but as being the medium by which other substances are conveyed to their roots to be absorbed unaltered or decomposed.

But if the earths yield a great and indispensable supply of food to plants, in a still greater degree, if possible, are vegetables dependent for their food on the gases of the atmosphere, and those produced during putrefaction.

From the earliest periods when men began to cultivate the earth, it must have been noticed, that the atmosphere exerted a very considerable influence upon vegetation. Some very evident facts would soon indicate this truth: the outer portion of the trees growing in a wood—the borders of all cultivated fields, by their superior luxuriance, would show that something was gained by these portions with which the interior sections of the crop were less copiously furnished. And that this was the common atmospheric air, was early determined by the Roman farmers, who carefully studied, therefore, the best disposal of their crops, so as to reap the full advantage of the most usual winds; just as in our days many of our island's best farmers are careful to drill their corn in the direction of the most prevalent winds, so that the breezes may circulate *along*, rather than *across* the rows. And then again, it could not long have escaped observation, how almost entirely some plants support themselves by the assistance of the atmospheric air, such as some of the mosses, the aloe tribe, and especially one or two of the eastern plants, such as the *Flos æris*, which will successfully vegetate when merely suspended by a string from the ceiling of a room. But then, when these conclusions were arrived at by the early philosophers of Greece and Rome, there their knowledge ceased; for they deemed the atmosphere to be composed of one simple elastic fluid: they had no suspicions that the air they breathed was a compound of three gases, and that a portion only of these were serviceable to vegetation. That was an advance in knowledge reserved for the days of Dr. Black and Dr. Priestley, and the dawn of modern chemistry. By this last-named celebrated chemist and other philosophers who aided him in his labours, it was shown that the gas which plants absorb in the light from the atmosphere, was the carbonic acid gas or fixed air (the same as is emitted from fermenting liquors), a gas com-

posed, as I have before remarked, of 27·27 parts of carbon, and 72·73 parts of oxygene, and always present in the atmosphere, of which in fact, it constitutes about $\frac{1}{300}$ th part. They found, too, that the plant possessed the power in the light of decomposing this gas; that it retained the carbon of which it was composed, and emitted the oxygene. It was next ascertained, that plants were benefited by increasing in the atmosphere in which they were placed the usual proportion of carbonic acid gas, and that the benefits derived from such additional proportion gradually increased, until the carbonic acid gas composed 9 per cent of the volume of the atmosphere (hence one great advantage of the application of decomposing organic manures, from which carbonic acid gas is copiously emitted). Many easy experiments illustrate these facts: thus, water is rendered more nourishing to plants by increasing in it the proportion of this gas, which all common waters contain; and, on the other hand, by removing from it the carbonic acid gas, by boiling, or other means, its nourishing powers are very materially reduced. It is found, too, that the supply of this gas, so essential to vegetation, to a very considerable degree influences the chemical composition of the plant: thus, all those nutritious substances in which carbon abounds, such as sugar and gum, are increased in the plant (to a certain extent) by its copious supply; but the plant becomes weak and languid, and its composition more watery, by its withdrawal—for instance, it has been ascertained, that a *byssus*, vegetating in the dark (when carbonic acid gas is emitted by plants), contains only $\frac{1}{3}$ th of its weight of carbonaceous matter; but, after being removed to the *light* (when carbonic acid gas is absorbed by plants) for thirty days, it was then found to contain $\frac{1}{2}$ th of its weight of carbonaceous matter. These results were confirmed by other experiments; and it has been found, also, that those plants which vegetate in the dark contain less oil than those which grow in the light; their resinous matters being as 2 to $5\frac{1}{2}$; their earthy matters were also considerably inferior, but then they had exactly double the quantity of water that the plants growing in the light possessed.

The application of carbonic acid gas to the *roots* of plants is also very beneficial; all those which vegetate in situations where this gas is emitted, speedily betray this truth by their increased luxuriance; it constitutes, in fact, the chief portion of the gases which are emitted from the fermenting dung of the farm-yard: hence one great advantage of applying organic manures, as by the manure-drill in immediate juxtaposition with the roots of the plant, so that the carbonic acid gas may be absorbed by the plants as it is gradually evolved in the process of

putrefaction. It has even been attempted, and not unsuccessfully, as by Professor J. F. Johnston (although such are very uncertain modes of examination), to calculate the quantity of carbon per acre, which, during a certain rotation, the farmer's crops derive from the carbonic acid gas of the atmosphere. And when this succession of crops was 1, potatoes or red beet with manure—2, wheat—3, clover—4, wheat—5, oats, it was found upon examination that the carbon contained in the crops amounted to 7544 lbs.; but that the carbon in the manure applied was only equal to 2513 lbs., and hence (supposing the land to have been in equal condition at the end of four years that it was at the commencement) 5031 lbs. of carbon must have been derived from the atmosphere.—*Lectures on Chem.*

Equally essential as a food or supporter of vegetation is oxygene gas (the vital air of the atmosphere of whose bulk it forms 21 per cent), for not a single vegetable substance has ever been detected in which oxygene does not form an essential ingredient: thus it constitutes of wheat starch 49·68 per cent, of wax 5·5, of sugar 50·63, of gum 51·3, of the wood of the oak 41·78 per cent. But although the presence of this gas is so essential to the healthy vegetation of plants, it is only during the night that their leaves absorb it—at the same time the great majority of plants emit *in the dark* carbonic acid gas. And the oxygen gas, thus absorbed, there is every reason to believe, instantly enters into immediate combination with other substances, since all attempts which have been made by mechanical or chemical means to recover the recently-absorbed oxygene of the leaves of different plants have utterly failed; and yet it is noticeable that those plants which absorb the greatest proportion of oxygene during the night, (when plants are made to vegetate in an atmosphere destitute of carbonic acid gas), are precisely those which evolve the most considerable quantity of oxygene during the day. Oxygene, indeed, is a true food of plants; it is essential to many of their functions; it is absorbed, not only by their leaves, but by their roots; in which last case it is combined with carbon, forms carbonic acid gas, and is then transmitted to the leaves, to be decomposed; it is absorbed also by the stems and branches of vegetables. In its absence flowers will not expand, seeds refuse to germinate. It is for this, among other reasons, in fact, that the farmer avoids placing his seeds so deep in the soil, that the vital air of the atmosphere cannot freely reach them. Different seeds, however, require proportions of oxygene for their germination; and hence one reason for the varying depth at which seeds are commonly placed. The proportion of oxygene, for instance, consumed

during their germination by barley and wheat is less than that of the pea, and yet the pea does not require so much oxygene as the common broad, and kidney beans—wheat and barley absorbing from $\frac{1}{1000}$ th to $\frac{1}{2000}$ th part of their weight, while the bean consumes $\frac{1}{100}$ th part. It has been also found by carefully conducted experiments, that the best water for watering plants is precisely that which contains the largest proportion of oxygene. In some of these, Indian corn, melons, hyacinths, and several other plants, were watered for some time with river water, impregnated with oxygene gas—the result was, that the Indian corn increased in bulk, “so as to equal in size most of those imported from North America;” the melons were improved in flavour, and all of them grew more vigorously.

Oxygene gas, therefore, must be regarded as one of the chief of the gases which constitute the true food of plants.

The last atmospheric gas which enters into the composition of vegetables, is the nitrogen gas, or azote; but how the plant acquires this, whether by its direct absorption from the atmosphere (of which it constitutes 79 per cent), or at the moment of its extrication from certain decomposing organic matters, or from ammonia, has not been clearly demonstrated. It exists, too, in vegetable substances, in proportions much smaller than those of either oxygene or hydrogen gases; for instance, the flour of wheat, when nearly ripe, contains only 2·3 per cent of this gas; its leaves only 1·3 per cent; the cabbage, 8; the potato, 2·9 per cent. It has been found, however, that when some plants, the barley, for instance, are made to vegetate in the shade, that they then contain twenty per cent more nitrogen than when vegetating exposed to the direct rays of the sun. Rapidly growing plants, too, contain more of this gas than those of the same kind which vegetate more slowly. It is also well known to the farmer, that when his crops grow in the shade, they have a peculiar deep green colour, and that certain animal manures produce the same effects, such as gelatine, oils,*urine, blood, ammonia, &c. Now these fertilizers abound with nitrogen; the fibrin of blood containing 46·66 per cent; gelatine, 16·998 per cent; albumen, 15·705 per cent; urea, 46·66 per cent; and ammonia 74 per cent. From these, and other facts of a similar nature, we are warranted in the conclusion, that nitrogen is also a constituent, or direct food of plants.

The last simple, or undecomposed gaseous substance which is abundantly found in some combination or other in all plants, is hydrogen: thus, sugar contains of this gas 6·90 per cent; gum, 6·93; bees'

wax, 12·672 ; wood of the oak, 5·69 ; wheat starch, 6·2 per cent ; acetic acid (the acid of vinegar) 6·35 per cent. This substance the growing plant acquires, either from the decomposing animal or vegetable substances of the soil, or by the decomposition of water. Carburetted hydrogen (hydrogen united with carbon) and sulphuretted hydrogen (hydrogen combined with sulphur), which are copiously evolved in certain situations during putrefaction, are peculiarly nourishing to vegetables. This is known to every one who has noticed the dark green of plants growing over covered drains or other places where impure matters are undergoing decomposition. And, when green vegetable substances are allowed to undergo putrefaction, under such circumstances that the volume of carburetted hydrogen and carbonic acid gas produced can only pass through the soil placed above them, the effect of their gases in increasing the growth of plants vegetating in that soil are very considerable. In this way, in an experiment of Mr. Knight, by constantly renewing during the summer months the green matters thus placed under a young plumb tree, its growth was accelerated in a very remarkable degree. The farmer, too, is aware, that when sea weeds and other green vegetable matters are used as manure, they cannot be ploughed into the earth in too fresh a state—if left to decompose on the surface for some time, their fertilizing effect is diminished ; something of considerable value is evidently lost. Now that something is chiefly hydrogen and the other gases of putrefaction.

In whatever way, in fact, either hydrogen or its compounds are presented to plants as food, the fertilizing effect produced appears to be considerable ; whether in organic manures or in gases, or in a still more extended degree as it presents itself in water, which is another great source from whence plants derive a very considerable portion of the hydrogen they contain. It would be difficult indeed, to account for the large proportion of hydrogen present in vegetable substances, without we allow that water is decomposed by plants ; and, although I am not disposed to adopt the perhaps too extensive axiom of Dr. Liebig, that all the hydrogen necessary for the formation of an organic compound is supplied to the plant by the decomposition of water, yet I fully concur with this distinguished philosopher in the copious means of supply which is thus readily afforded to vegetation. Water, therefore, the cultivator may safely consider, does not only operate on vegetation by its moistening qualities, but that it affords by its decomposition two of the essential elements of vegetable substances—viz., hydrogen and oxygene, of which water is composed, in the proportion of one part by weight of hydrogen, and eight parts of oxygene. It was, perhaps, from some rude observa-

tions of these services of water to vegetation, and certain sagacious reasonings founded upon them, that some of the Greek and Egyptian philosophers so readily adopted the opinion, that water was the only food of plants. And this easy conclusion was for many ages that of several philosophers, distinguished for their laborious researches and their ardent love of truth. Amongst these may be mentioned Van Helmont, Bonnet, Duhamel, Tillet, and the celebrated Boyle.

When, however, as I have before remarked, succeeding chemists and more rigidly accurate experiments proved, that the water with which these philosophers made their trials contained impurities; that the rain water with which Van Helmont watered his willow tree held in solution minute proportions of the earths and certain saline substances, it was then clearly perceived that all these experiments of the early chemists were deceptive.

Water, *chemically pure*, has been since tried as the sole food of plants in a variety of ways, but with uniform ill success. The plants thus nourished, it is true, vegetate for a time, but they never perfect their seeds. Every experiment which I have made in this way has been uniformly unsuccessful; and those of Dr. Thomson, of Hassenfratz, and of Saussure, have met with a similar result: even aquatics languish in water chemically pure. And to the truth of these facts many practical observations concur. Every grower of bulbs in water-glasses is aware of the impossibility of thus blooming them for two years in succession. They must pass a year in the soil before they can be again successfully used in water-glasses. If this is neglected, they not only cease to bloom, but at last they refuse to vegetate. And, again, every gardener well knows that clear well water is the worst (because the purest perhaps) of all common waters for the nourishment of his plants; he prefers the most impure ditch or pond waters, abounding with organic and other matters; and the more skilful even render it a weak liquid manure, by adding to it the excrements of animals.

But the examination of this portion of the question as to the true food of plants has been still further pursued. A soil has been carefully formed, composed of only the four pure earths of which all cultivated soils are formed—the only four earths, too, which enter into the composition of plants, viz., silica, lime, magnesia, and alumina. Now, in a soil even thus composed, and moistened with water *chemically pure*, no plant will flourish. Every attempt which has been made has proved unsuccessful; although when the impure waters draining from a sewer or a farm-yard were substituted for the pure water, the plants were found to flourish most luxuriantly.

The cultivator, therefore, must not conclude, however extensive its services really are to vegetation, that water is the only food of plants. Yet how important its real services are, no intelligent farmer will hesitate to acknowledge. In the scientific regulation of the due supply to his crops of this aqueous food, consists, indeed, one of the chief cares and studies of the skilful agriculturist. From the first effort to improve a barren soil, by removing by expensive drainage from his land the superabundant stagnant waters, his care with regard to water commences. And this once removed, then succeeds an equally important consideration—the due and regular supply of moisture by the soil to the roots of his growing crops, in the degree the best adapted to the natural habits of the plants he intends to cultivate. It is for this purpose that he adds sand, or chalk, or marl to his too retentive clays, and spreads clay and the other more adhesive earths over his porous sands. And, again, the farmer has long since discovered, that by incessant stirring of the soil, as by hoeings, even in the driest weather, that the air is assisted to penetrate to the roots of his crops, very advantageously to their growth. Now this benefit is, to a very considerable degree, attributable to the unvaried presence in the atmospheric air of a proportion of insensible moisture, which, by a beautiful arrangement in the economy of nature, abounds the most in the driest seasons, so that when other sources of a due supply of water are removed, this is increased. At a temperature of 50° of Fahrenheit, about one-fifteenth of the weight of atmospheric air consists of water, but at a temperature of 100° one-fourteenth of its weight is composed of moisture; and this is absorbed from the atmosphere with considerable rapidity, not only by the leaves, but by the roots of plants. Some of the aloe tribe and the house leek in this way increase in weight, even when placed on a dry shelf or suspended in the atmosphere.

Hence we may safely conclude that water is not only a food of plants, as absorbed from the soil and the atmosphere unaltered, but that, by its decomposition (as I have already remarked), it affords in hydrogen and oxygene gases two of their most essential elements.

The water of the soil, however, (and rain water even, is hardly an exception to the rule), is never pure; it contains, amongst other foreign substances, organic matters, earths, and several salts—saline substances, moreover, which are commonly found in plants as their essential constituents, and this is not a very recent chemical discovery.

It was long since ascertained that certain saline substances existed in most vegetable substances, and the question soon arose whether these salts came there by chance, or that they were merely imbibed by the

moisture of the ground, or whether they existed in plants as their essential food or constituents. All later researches have rather shown the correctness of the latter supposition. For it has been clearly proved by carefully-conducted chemical experiments, that plants exercise a very remarkable power of separating various salts from their solutions, and that they are not therefore compelled to absorb these salts because they are dissolved in the water by which they are nourished; and also, that even if two or three salts are dissolved *together* in water, that then the plant separates these, absorbing some and rejecting others in a very noticeable manner.

Then again it is found that certain salts are found abundantly only in particular plants, and that these saline bodies exist in them in all soils and situations, and that when these are withdrawn from the ground on which they grow, that then they merely maintain a sickly existence. Thus potash (existing as a carbonate that is united with carbonic acid in plants) is furnished by the combustion of almost all vegetable substances. The stalks of Turkey wheat yield 1.75 per cent of this saline substance, the bean plant 2 per cent, vetches 2.78 per cent, the common nettle 2.5 per cent, and wormwood 7.3 per cent. Soda is obtained in abundance from marine plants, the *salsola* soda yielding nearly 2 per cent of it. And again, the salts of soda and potash are copiously present in sea-weeds, and these every farmer near the sea-coast is aware are excellent fertilizers.

Phosphate of lime (the earthy salt of bones) and phosphate of magnesia (two salts composed of phosphoric acid united with these two earths) abound in most plants. Phosphate of lime, is, in fact, a constant ingredient in them. In the ashes, for instance, of the seeds of wheat are found 44.5 per cent of these salts, 46.5 in the seeds of the bean, 27.92 in the vetch, 32.5 in the barley, 24 in the oat, and 17.5 per cent in those of peas. Now the phosphate of lime is the chief fertilizing ingredient added to the soil in the extensively-used and valuable fertilizer, bones. And as a proof of this salt being the most valuable portion of the bones, every Lancashire and Cheshire farmer is well aware that when every particle of grease is removed from them by the calico size-makers, that they are still just as valuable as in their fresh unboiled state for manure. And the avidity with which the turnip plant, for instance, encircles with its roots a fragment of crushed bones is known to every farmer. The turnips thus dressed, there is every reason to believe, contain more phosphate of lime than turnips grown in a different manner; that they differ in composition is certainly the opinion of

those who thus cultivate this invaluable root. I learn from Mr. —, of —, that he, in common with most of the Lincolnshire farmers, deems the turnips manured with bones rather more nourishing than those raised with the ordinary farm-yard manure.

Another salt, sulphate of lime (gypsum), is also invariably found in certain commonly-cultivated crops, such as in lucern, sainfoin, red clover, &c. It has been found that these crops always languish in those soils from whence this salt is absent, and that those are precisely the lands which the farmer finds most benefited by an application of gypsum. An ordinary crop of red clover contains about 2 cwt. per acre of sulphate of lime; and this proportion, it is worthy of remark, is almost precisely the weight of the dressing applied to the land by those who use gypsum as a manure. It has been supposed that sulphate of lime and phosphate of lime are thus placed in plants to add to their strength and durability; that they perform a similar part, in fact, to the bones of animals.

And it is certainly observable that the same salts of lime (the phosphate and the carbonate) which constitute the chief portion of the bones of animals, are precisely those salts which are the most copiously found in the ordinary crops of the farmer.

Carbonate of lime (chalk) and carbonate of magnesia abound in vegetable substances. The ashes of an oat plant were found to contain more than 5 per cent of carbonate of lime; 6 per cent were discovered in the ashes of the pea plant, 4·12 in the vetch, (but none in a plant raised in distilled water), 0·25 in the seeds of wheat, 1·0 in its straw, and 12·5 per cent in the *straw* of barley, but none in its seeds.

The salts of ammonia, too, are fertilizing dressings for some crops; but they can hardly be considered to be the direct food or constituents of plants in the same proportion as some of the other salts found in vegetables. Ammonia is, in fact, but rarely detected as an ingredient in vegetable substances in considerable proportions. Muriate of ammonia, it is true, has been detected in woad, and in one or two other plants; but the general advantage to plants of the application of the compounds of ammonia, arises from the readiness with which it is decomposed, and its elements (nitrogen and hydrogen) assimilated with the purely vegetable matters of the plant. In very small proportions, however, ammonia is a very common ingredient in vegetation.

The metallic oxides found in plants are chiefly, 1, the oxide of iron, 2, the oxide of manganese. These two oxides are commonly present in most soils. The black pebbles of the gravels owe their colour to

the presence of the black oxide of manganese. Oxide of iron is the cause of the red colour assumed by burnt clays. Neither of these oxides exists in any great proportion in plants, and they are most probably absorbed from the soil unaltered.

It is both useful and interesting to apply these chemical truths to the results produced on the farmer's crops by the application of various fertilizers; farm-yard manure, for instance, as it undergoes decomposition produces a considerable quantity of carbonic acid and carburetted hydrogen gases; both of which, we have already seen, are the direct constituents or food of all the commonly cultivated crops—gases which are immediately and copiously absorbed by the growing plant, and assimilated in various vegetable substances. Ammonia is also produced, which either enters into the composition of the plant or is decomposed, and its constituents employed in the formation of fresh vegetable matters. Common farm-yard manure, too, affords all the direct compounds of the growing plant—the silicate of potash (silica combined with potash) of the straw—the phosphate of lime of the seed and the stem—and the other salts of which the straw is partly composed. And, with regard to one of these, phosphate of lime, it is well known to every farmer, that the manure produced from corn-fed animals is peculiarly valuable. The chemist finds that the excrements of these contain more phosphate of lime than those from any other animals fed only on vegetable substances.

We have seen also the advantages derived to vegetation, by the attraction of the earths and other substances of the insensible vapour of the atmosphere. Now the access of this moisture to the soil is not only promoted by the mechanical action of organic fertilizers, but the attraction of all the common farm-yard manures for the insensible aqueous vapour of the air, far exceeds that of any of the earths, or the richest soil. In my own experiments, when 1000 parts of a rich alluvial soil absorbed only 14 parts of water, lime 11, and chalk only 4 parts, horse-dung absorbed, under precisely similar circumstances, 145 parts, cow-dung 130, pig-dung 120, sheep-dung 81, and pigeons' dung 50 parts.

The action of almost all of the earthy and saline manures is equally easy of explanation on chemical principles. The farmer never adds a single fertilizer to his soil, that does not, in its simple or decomposed state, enter into the composition, or become food for plants. It is with this intention, or at least the same effect, that gypsum is added to those crops which require for their food sulphate of lime; bone-dust for the use of turnips and the cereal grasses, in which the phosphate of lime abounds, and is equally required as a food; and if the cultivator some-

times adds these to his fields in proportions much larger than is necessary for the chemical use of the growing crops of his land, it is with the intention of enabling that soil to retain or absorb from the atmosphere a more profitable proportion of either its gases or its aqueous particles ; so that, if not needed for its own chemical elements, the manure beneficially operates by the retention or absorption of other food of vegetable life.

All such investigations as these cannot but give confidence and power to the tiller of the soil ; for, not only will such knowledge guard him against many erroneous, many vague attempts to increase the supply of food to his crops, but it will confirm him in the belief of many great and practically important truths, which are wont to be disputed by the idle and the thoughtless. The longer he studies facts like these, too, the more he will see cause to feel convinced that nothing was created in vain, or is ever finally wasted (and it is a happy consolation for the indolent and careless that it is so), but that even every particle of gaseous matter evolved during the putrefaction of his manures, which escapes into the atmosphere, although lost to the farm he cultivates, yet will be again absorbed by other plants, and again made available for the beneficent purposes for which He who created them intended that they should fulfil.

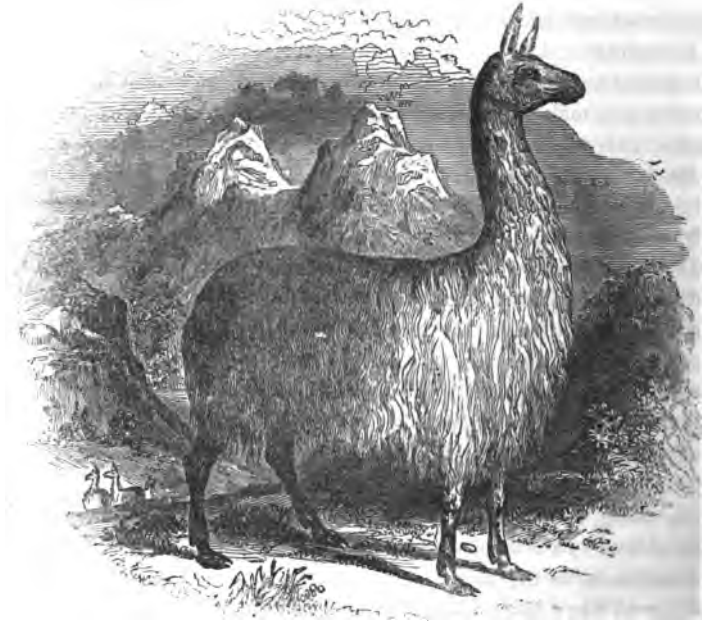
14, GRAY'S INN SQUARE,
October, 1843.

CONFLAGRATION IN THE WOODS OF CANADA.

The long-continued drought throughout the province has been in many places attended with the most disastrous results. A conflagration, second only in extent to the great Miramichi fire, has for many days been raging in every district. Aided by high winds, the flames have spread with a rapidity almost incredible, and thousands of acres of uncleared forest land have been, both as respects the soil and timber, irreparably ruined. Extensive clearings offered no bar to the progress of the fire ; a kindled leaf borne by the wind sufficed to create a new flame among the parched tinder-like material of the forest ; or a spark lodging on a decayed stump instantly produced a flame which in its turn sent forth thousands of fiery messengers, which, leaping on from spot to spot, in a manner which needs to be seen to be understood, soon communicated with the forest again to leap and crackle and roar among the tall victims of its embrace. In the swamps which are perfectly

drained of moisture, where young cedars and pines form a thick and continuous bush of highly inflammable matter, and where the soil to a considerable depth consists of vegetable matter (black muck as it is called) in a partially decomposed state, almost identical with peat, the conflagration has raged with the greatest fury and with the most disastrous effects. The swamp land, when cleared and drained, if upon a clay bottom, owing to the continued decomposition of its burden of vegetable matter, which it will take years of cropping to exhaust, is the most productive land that the farmer can place under cultivation. But when this matter is reduced to ashes, and the substratum of clay baked and hardened almost into brick, for all present purposes such land is rendered useless, and it will require long ages of vegetation to again replenish the soil. Nor does the evil rest here; the large amount of ashes created by the burning—in some swamps we have seen during the last week two, and even three feet in depth—contain so great a quantity of potash, that its liquefaction by rain will effectually burn up and render barren the soil which the fire has spared. Unfortunately the damage to the farmer has not stopped here; but in hundreds of cases the upper soil of his cleared land has been burned off, his oats, and in some cases upon new land, his potatoes and turnips destroyed, and too frequently his new-stacked hay and grain have fallen a prey to the flames, and there are few who have not suffered more or less in the destruction of their fences. In some instances barns and dwelling-houses have been consumed, but these are fortunately few. Throughout the county of Beauharnois, our correspondents write, the destructive element has been sweeping in every direction. From the St. Lawrence by night, the glare upon the sky marked the progress of a tremendous fire in the rear of the route of the Beauharnois Canal, is a swamp called Tea-field, extending about ten miles through to the townships of Ormstown and Godmanchester, and in the Seigniory. Upon the upper side of this immense swamp, stretching over many thousand acres, there yet remain terrible evidences of the Miramichi fire. This tract of country is called the "Pine Plains," and its name to those who have ever looked upon it is synonymous with desolation in its most hideous form. As far as the eye can reach, pillaring the horizon in branchless barkless nakedness, spread thousands upon thousands of mighty pines, some charred and blackened with the embrace of the destroyer, others bleached with the winds and rain of years; they stand like pillars set by Time to count his ages by. Upon those plains, before the fire came, stood an exhaustless mine of wealth—masts for the navy

of an empire for ages—and now the great worm bores his way through the dead timber, and the woodpecker's incessant tap only breaks the silence of the solitude; there man has no share, his footsteps never tread. The ground around these dead sticks is covered with rasp and blackberry bushes, and the solitary bear makes merry, and lives at his ease, for this is his garden, and who shall disturb him? Through a portion of this desolate region the fire has been lately raging, and, owing to the decay and dryness of the timber, has, instead of its usual consuming only the underbrush, leaving the heavier timber killed but yet standing, left nothing but ashes in its track. During the last week, it was the fortune of the writer of this article to be in the vicinity of the conflagration during the night, and a scene more terribly beautiful eye never looked upon. The flames, with a roar like the rushing of a mighty stream, were pouring across the plains; now rising, now falling, like waves, and licking up every living and every dead thing in its track; dashing against the tall pine sticks, curling and climbing up their mighty heights, and leaping from tree to tree, and crackling and roaring and rolling along, as if it bore the souls of 10,000 demons, and this was their jubilee. In the distance lay the blackened track of the fire, which ever and anon, as the wind swept over it, gave forth a cloud of sparks, and glowed like a lake of lava; while here and there a solitary stick, as yet unconsumed, reared its pinnacle of flame, a mass of kindled charcoal, to the very heavens, like good men's deeds amidst the darkness of the world. And then on every side, above the roaring of this mighty furnace, every instant came the heavy crashing fall of timber, sweeping a course before it, and illuminating the scene still more brightly for a few seconds. Far away in rugged majesty towered the bleached and blackened sticks of this interminable waste, now ruddy with the glow of the flames, now standing out distinctly from the horizon, now sinking into obscurity and looking more desolately dark than ever. Indeed it was a scene which words have but feeble power to describe—it was a scene to be beheld, not told.—*Montreal Courier.*



NATURALIZATION OF THE ALPACA.

The naturalization of the alpaca, we rejoice to say, advances securely, though slowly ; and had it not been for the untoward accident by which the country was lately deprived of an acquisition, consisting of no less than 450 of these interesting animals, suffocated through the injudicious shipment of guano in the lower hold of the vessel in which they were embarked on the Peruvian coast, the friends of this valuable scheme, to supply our farmers with a new stock for their waste and useless lands, would, ere this, have had just reason to exult. Through the enterprise of a few individuals, it is, however, to be hoped, that this lamentable loss will soon be repaired, for a feeling of interest has been excited and gone abroad on this subject, which will make up for the privation ; and in the intermediate time, small parcels continue to arrive, as the facilities of embarking them admit. In this respect, Liverpool may be justly proud of her exertions. A few noblemen have already become breeders of alpacas ; and it is confidently understood that there are other spirited capitalists among the higher ranks disposed to enter the list, who

are only waiting the opportunity of being able to purchase a stock sufficiently large to make their rearing on mountain farms an object of speculation.

From the experiments already made, whether in England, Scotland, or Ireland, it is on all hands agreed that the animal is suited to our climate and pasture. Indeed, those who have observed its progress among us with an observant eye and a philosophic mind, are astonished at the ease with which the alpaca accommodates itself to our soil, and the improvement which follows in its fleece. At this we ought not to feel astonished, when we consider the great elevation of the country from which it is brought, and the scanty food which it is obliged to pick up on the broken and barren slopes of the Andes. Every year the value of alpaca wool is enhanced, because the textures made with it gradually become known abroad, and consequently are asked for. Brazilian clergymen, as a luxury, now wear black alpaca stuffs; and by the Spanish women they are preferred for their church and street dresses. In France and England ladies seek after fancy goods made from the same material. There is, therefore, every certainty that the consumption of this wool in Europe will increase; indeed it has already exceeded the capabilities of the only country which supplies it. In Upper Peru, (Bolivia), that interesting region—that immense *plateau*, studded with lakes, and presenting a surface nearly equal to that of France—the number of alpacas is now estimated at no more than half a million; and the population, purely Indian, does not exceed the same amount. What a lamentable desolation will this be thought by the philanthropist, when he reflects that in the time of the Incas this same territory was inhabited by eight millions of aborigines, who for their food and clothing required at least at the rate of four alpacas per head! Yet such has been the effect of Spanish conquest, and had it not been for the late demand for alpaca wool in Europe, which has proved an incentive to the Indians to husband their flocks and increase their number, such have been the ravages of time—such the effects of apathy and despair—that before this period they would have decreased to 350,000 head.

The Indians of Peru have, however, been awakened to a sense of their own interest, and are now making the most of their alpaca wool; but they are so few in number, the tenure of property is so insecure among them, and their other avocations so great, that it is not expected they can raise their flocks much beyond the present number; and it is not to be forgotten that none of the mixed races, having Spanish or African blood in them, will attend to this branch of industry. Taking

then the number of alpacas in Peru at 500,000, and the fleece of each at 10 lbs., the annual supply cannot exceed 5,000,000 lbs., part of which is consumed in the country, and some shipped elsewhere, say only one-half to England, or 2,500,000 lbs. And what is this quantity for our manufactures, when it is taken into account that we have more than 30,000,000 of sheep grazing in the British isles, and are besides obliged to import from foreign lands immense assortments of wool to feed our looms? Here, then, we have an opening which our farmers ought not to overlook, more particularly as the animal in question will not in the least interfere with the stock already located on their estates. It is estimated that we have still upwards of 30,000,000 of acres of waste lands in our isles, one-half of which, by the various new methods of drainage and tillage, may be rendered serviceable; but the remainder, owing to the inequality of the surface and other causes, cannot be reclaimed. Upon them sheep and cattle cannot find food; but there the alpaca would nevertheless thrive and procreate, rewarding the owner with a fleece from 10 to 12 lbs., which he can sell from 1s. 8d. to 2s. 6d. per lb., besides supplying his table with wholesome meat.

If we cannot increase the surface of our land, at least it is in our power to render that part of it profitable which is now left desolate and neglected, serving neither for the food of man or beast. We cannot grow silk; neither can we rear the vine, olive, cotton, or tobacco; but we can breed an animal whose fleece will repay us better than the produce of either. From its peculiar quality, its glossiness, and applicability to fine weaving, alpaca wool, even in the rough and comparatively dirty state in which it is brought to us, almost rivals silk, and in some respects it is preferable. It sits better in the folds, and, besides, enjoys the advantage of novelty. Its quality, as before remarked, will improve on our soil, and greater care will also be taken in the sorting and packing. If we make it our study, we therefore are in a situation to secure at home an adequate supply of this valuable and new raw material, improved in quality, and calculated to give an attractive variety to our manufactures, without in the least diminishing the pasture reserved for our native flocks. In the selection of those breeds intended to be naturalized among us, it may at the same time be proper to remark, that great care ought to be observed. The black and white are far preferable to the brown and mixed colours; and, in order to obtain uniformity in the fleeces, attention ought to be paid when the union of the sexes takes place. Above all, crossing with the llama is to be avoided. This race of Andes sheep was first brought to this country as a curiosity; and, in

the way of experiment, the llama has in several instances been intermixed with the alpaca ; but, besides a deterioration in the wool of the latter, a spurious hybrid has been produced, unfitted for propagation. The two species ought, therefore, to be kept perfectly distinct. The principal doubts which at first suggested themselves, regarding the means of naturalizing the alpaca among us are now solved ; it being fully ascertained, that they not only thrive and prosper on our soil, but also that their fleeces improve. In the present age of speculation, the results obtained are consequently sufficient to encourage the experiment on a more extended scale ; and, if anything astonishes us, it is the fact that so few noblemen have hitherto competed for the glory of aiding in the introduction of this serviceable stock on the British farm, when, at the same time, their capital might be so profitably employed. This appears the more strange when the rage for merinos is remembered ; the introduction of which was patronised by George III, and several of our leading nobility. And yet the merino is no more than a common sheep, without any particular recommendation, and, as time has proved, by no means suited to our soil. Are then those spirited and patriotic individuals no longer to be found among us ? It is understood, that Prince Albert has lately purchased a pair of alpacas, with the intention of rearing their offspring. To that distinguished personage the British farmer is already largely indebted for his encouragement of agriculture, and more particularly as regards the breeding of cattle. May the naturalization of the alpaca rank among the obligations which we shall owe to that enterprising and considerate prince.—Your obedient servant,

WILLIAM WALTON.

9, FITZROY STREET, Fitzroy Square,
November 16, 1843.

EXPERIMENTS WITH MANURES.

[From the "Doncaster Chronicle."]

SIR,—Having been frequently requested to state the result of several trials I have made with different sorts of manure, upon a farm at Firbeck, in the occupation of H. Gally Knight, Esq., M.P., during the present year, I beg to trouble you with the following particulars, which, if not perfectly satisfactory from the want of more minute detail, may, nevertheless, be of some service by exciting enquiry, or the adoption of more extensive experiments, and so lead to some permanently beneficial result.

Each experiment was made upon one statute acre of limestone land, (on the magnesia formation), of a fair average quality, and in tolerably good condition; and the cost of each description of manure applied was *twenty-eight shillings* per acre.

The manures used were Haywood's chemical manure, manufactured at the Gas Works, Worksop; Sewell's chemical manure, manufactured at the Trent Lock Works, Nottingham; White's chemical manure, manufactured at East Retford; guano, sulphate of ammonia, and nitrate of soda.

For Swedish turnips Haywood's and Sewell's chemical manures and sulphate of ammonia were strewed equally over the land, which was then lightly harrowed, and immediately afterwards ridged, and the seed drilled, White's chemical manure was drilled in ridges with the seed; and the guano was mixed with an equal quantity, in measure, of wood-ashes, and also drilled on ridges with the seed; nitrate of soda was not used for turnips.

The land was in a favourable state, and the drilling took place under similar circumstances for all.

Those dressed with Sewell's manure came up the first, and more abundantly than any other; and up to the present time are the best, and exhibit great vigour. White's manure was the next, and are very little inferior to Sewell's, though they were not quite so early out of the ground, and are not so luxuriant in appearance now.

The guano tilled came up next, but not regular, as was the case with those dressed with sulphate of ammonia; and both are inferior to the two first, though the guano-dressed turnips have made the greatest comparative improvement of any during the last month. Those dressed with Haywood's manure were the last to make their appearance, and came up very irregularly, owing, of course, to a portion of the seed being destroyed by the too active influence of the compound. A more favourable result, I am informed, would have been obtained, had saw-dust or sand been first mixed with this manure. The turnips are growing very freely upon this portion, and still likely to prove a good crop.

Considering the backward turnip season on limestone lands, and the small outlay per acre for tillage, our experimental crop bids fair to be a good one; and, when arrived at maturity, the different portions shall be fairly tested by *weight*.

For oats, the different manures were strewed broad-cast, and harrowed in with the seed (except White's, which was only used for turnips), and I can only state the *apparent* results, as the crop is not thrashed.

Sewell's manure took the lead in producing the most luxuriant appearance for the first two or three months; Haywood's manure was the next; guano the third; and the sulphate of ammonia and nitrate of soda the fourth, and about alike. The result, at harvest, was an immense crop altogether, but that tilled with guano was then decidedly the best; sulphate of ammonia was the next; then nitrate of soda, then Sewell's and Haywood's, which were nearly alike. It is probable that the *quality of the corn* from the two latter will be the best, as the straw was not nearly so much lodged, but it is seldom that so great a quantity of produce is seen on this limestone land, as on the two pieces tilled with guano and sulphate of ammonia.

For hay, the different manures were strewed broad-cast upon old grass land of equal quality, and little difference was to be observed in the earlier stage of their operation, except that the grass upon the portion tilled with nitrate of soda and sulphate of ammonia, assumed a darker hue, and gave promise of being more luxuriant than the other, particularly where the nitrate of soda was used. On the 15th of July the grass was weighed soon after it had been mown, but when perfectly free from any extra moisture, and the following is the weight produced on each acre:—

	Tons. Cwt.	
Guano, tilled.....	8	18
Haywood's	7	2
Sewell's	6	12½
Sulphate of ammonia	6	5½
Nitrate of soda.....	6	1½

There was no difference to be perceived in the eddish, except where the guano was used, which was rather stronger than the rest.

For pasture only three sorts were tried, viz., guano, nitrate of soda, and sulphate of ammonia, which were strewed broad-cast in the month of April. The nitrate of soda produced the first effect in appearance, but only two or three days before the sulphate of ammonia, and during the remainder of the season no difference could be perceived between them. The grass tilled with guano did not grow so rapidly as the other at first, but there was an increased quantity of *clover* upon it during the remainder of the summer.

When the cattle (milch cows) were turned out in May, they immediately selected that part which had been tilled with nitrate of soda, and for the first few days they confined themselves almost exclusively to it; they then commenced upon that where the sulphate of ammonia had been applied, and completely bared those two places, before they would

touch the grass to which the guano had been applied, although the different pieces adjoined each other. The herbage on the guano tilled part was most luxuriant, and of excellent quality, and yet the division line between it and that of the nitrate of soda was almost as easy to distinguish, for two or three months, as if a scythe had been employed to effect it.

The cause of this is probably in part to be attributed to the nauseous effluvia arising for a time from the guano, as well as from a bitter principle imbibed by the plants from it; which renders the grass less palatable to the cattle; and, for the same reason, it is stated that turnips tilled with guano are seldom attacked by the fly. I have used it for turnips in the last two years, and certainly can so far bear testimony to such being the case.

Having endeavoured to give you a plain statement of facts, as far as they can be ascertained, up to the present time, I leave the application of them to such as deem them worthy of notice; but when we find the difficulty annually increasing of providing a sufficiency of that most valuable and permanent of all tillages, *bones*, in consequence of the extended demand, as well as of another most valuable help to the agriculturist, *rape-dust*, it is almost a matter of necessity, as well as of duty, to ascertain what may most usefully and economically supply their places to such an extent as will not only provide for the deficiency, but operate at the same time in keeping the price of all artificial tillages within reasonable bounds.—I remain, sir, your obedient servant,

JNO. HORNCastle.

THE YEW, Nov. 8, 1843.

Oregon Flax.—The Rev. Samuel Parker in his tour through the Oregon Territory, mentions the spontaneous and prolific growth of flax in that region. He says—"In everything, except that it is perennial, it resembles the flax which is cultivated in the United States; the stalk, the boll, the seed, the blue flower, closed in the day, and open morning and evening. The natives use it for making fishing-nets. Fields of this flax may be mown like grass, for the roots are too large and run too deep in the earth, to be pulled like ours; and it would save the trouble of cultivating."

RETROSPECT OF THE YEAR 1843.

Addressed to SAMUEL TAYLOR, Esq., of Stoke Ferry, Norfolk.

MY DEAR SIR,

It has occurred to me, that some interest would be excited among agriculturists, were it possible to collect together a series of well authenticated facts, concerning the various and striking phenomena of the last year; so far, at least, as they could be referred to the growth and productiveness of the late harvest of grain, now completely finished and secured. I have been an observer of meteorological data during a great number of years, and can refer to tables of the leading phenomena, generally registered: I have seen and noted seasons of every description; but never recollect one which, as a whole, has so abounded in anomalies as the year 1843; nor one more calculated to effect, and keep up those perplexities that have been proved to exist in almost every part of the United Kingdom. Having received much local instruction from you, conveyed in the kindest spirit, and knowing that you are a close observer, I have been the more desirous to offer the following remarks (which of course must be restricted) to your notice, inasmuch as I deem it highly probable, that they may be, to some extent, authenticated elsewhere, and thus become comparatively more worthy of credence. We should much enrich our meteorological diaries, were correct registers made, and compared throughout the kingdom. At the same time, it must be acknowledged, that diaries kept in places by no means remote, contain notices so utterly at variance, as to startle and confuse the enquirer. Some of these discrepancies I shall have to notice.

It is, I believe, an ascertained fact, that since the glorious year 1835, though there have been, in the main, good and propitious harvests, yet no one year has passed without some threatening aspect. It is true, also, that the celebrated comet of Halley appeared (thus according with astronomical calculation) in October of 1835, and it was declared, on the authority of the old chronicles, to *have ever been* a prognostic of evil! The year 1836, whose harvest promised to be rich, was broken up by the awful thunder-storms of July; and though summer lingered in the south, it vanished altogether in Scotland. The spring of 1837 was so keenly frosty, that 10° were observed in the middle of April; and every one remembers the frightful winter which followed, wherein the mercury receded some degrees below zero. 1839 was wet: great damage was thus occasioned in the later corn districts. The next year

opened with deep floods, which the deluges of the preceding autumn had deposited in all the river valleys ; and these continued to prevail till the middle of February ; after which, a perfectly fine, but keen March restored the land, and introduced the weather that certainly carried on to perfection the fine corn of 1840. Again (1841) a year of doubtful character occurred ; but its early spring, after extremely keen frosts in January, was one of beauty. On the 27th of May, however, with a sultry heat of 80°, one of the most tremendous displays of electricity took place which we have on record. Whole districts were ravaged with hail for many miles west of Windsor Forest ; and, from that period, a cold rainy season, with a few intermissions of sunny days, was established.

As in the commencement of 1840, so the year 1842 found on the 1st of January the lowlands filled with water ; every rill, nay, almost every furrow, was replete with it. But, fortunately, instead of continuing till February, the rain had abated : and January proved exceeding fine : the air was keen and bracing, though by no means severely frosty ; for the lowest fall of the thermometer was not beneath 25°, by my table, and that only on the 4th and 16th mornings ; yet the average of day and night throughout the month might be stated at a degree or two only above the freezing point. February was a cloudy month, but not profusely wet ; and at the middle of it the barometer attained the unusual height of 30 in. 40 cents. March, however, instead of being fine, brought back the floods ; for the lands, not having recovered their temperament, were soon drenched again by the first profuse rains : and thus, in April, the lowlands were swamped, and the furrows of many corn-fields became rills of water.

April was beautiful ; its gradually increasing warmth, and preponderance of sunshine, restored all things, and vegetation rushed on with rapidity.

Day after day, toward the close, the power of an unclouded sun rendered the earth a hot-bed ; and it became evident, that unless May were showery, there would be a deficiency of straw. But May, with few exceptions, continued warm and dry, and wheat was seen in ear on the 31st.

Nothing more need be said of 1842. The weather and harvest-season were perfect. The ears of corn were full and ponderous, but the sheaves, in consequence of the paucity of straw, were remarked by every one for their pigmy dimensions. On the 7th September, the summer was entirely broken up by a storm of thunder, which, for its continuous glare of pink lightning, might almost vie with that of May, 1841.

The autumn of 1842 proved in every respect an excellent wheat season: the seed was deposited in a capital bed; it germinated, grew steadily, yet not over luxuriantly; though after the few frosts of October, the temperature was extremely mild; my register indeed, shows but two nights in November—the 4th and 27th,—and five in December, wherein the mercury fell below the freezing point, the lowest being 13° of frost on Christmas morning.

We now come to the review of the past season, having been induced to take the foregoing cursory retrospect of seven years, in order to establish the position that, subsequent to the appearance of Halley's comet, the seasons have been more or less out of joint; and in this, if the past chronicles be correct, the recent phenomena have accorded; for every meteoric power has been displayed in extremes, lightning has proved tremendously destructive, storms have been violent, and the hail a most severe scourge!

1843. The new year found the land covered with vast breadths of rich and verdant corn, without the appearance of flood anywhere; the temperature was healthily reduced to that bracing condition which renders January a very joyous season, and the first days were very brilliant. The average temperature at a minimum of all the nights, I found to be about 35°, that by a maximum in a north-east aspect rather above 42°. Herein the Berkshire register of the minimum agrees very nearly with that of Norfolk, namely 34°; but there is a considerable difference in the day maximum, the Norfolk register averaging $53^{\circ}\frac{7}{8}$. The lowest temperature occurred with me on the 21st, 33°, and the maximum on the 28th, 54°, whereas in Norfolk, the maximum or 56°, must have been approached very frequently, otherwise the total could not have exceeded 53°, as above.

The quantity of rain in Norfolk, is stated to amount to 2 in. 91 cents. In Berks there was little snow, and a very moderate descent of rain; but a prodigious storm of wind occurred on the 13th, with the very great depression of the barometer to $28\frac{3}{8}$ in.

No disaster could be traced during this benign but rather cloudy month, the wheats flourished and were equally close on the ground as they often are found in April.

February commenced with a fine day—lowest degree 43, highest 50°; but winterly appearances soon succeeded, and we had wind, cold rain, scuds of snow, and some frosty nights. The third week, with east and north-east winds, was rather keen, the 15th 16th and 17th mornings showing 9°, 11°, and 10° of frost. The latter end of the month was

milder, but with cold rain, snow, and sleet occasionally. The corn was somewhat retarded, but never decidedly checked in its progress.

The lowest average temperature of all the nights I estimated at $32\frac{1}{4}^{\circ}$, the greatest by day at $37\frac{1}{2}^{\circ}$, the barometer never ranging above 29 in. 90 cents, while on the 27th and 28th days it receded below 29 in. By your table it appears that the lowest average was $32\frac{3}{100}$, the greatest $42\frac{3}{100}$, the quantity of rain indicated by the gauge being $2\frac{6}{100}$ in.

March commenced with a beautiful day, the temperature at three intervals being 32° , 40° , and 32° . A steady northern air secured fine sunny weather with night frosts till the 5th, then the wind shifted to east, and wavered a few points to the south and north of east. The barometer rose from 29 in. 56 cents, to 30 in. 27 cents, and remained about 30 in. till the 12th. Nothing could exceed the beauty of the weather till the night of the 17th, when at 8 o'clock p. m. a *luminous beam* became visible, which extended at a low angle from the western horizon, till it terminated below and between the bright stars *Rigel*, *Orion*, and *Aldebaran* in the Bull's Eye. This beam was in figure perfectly parallel, without any divergence; in texture quite transparent, every star that it passed over being seen through it: it remained till about 20 minutes after 8 o'clock, and then vanished. On the 18th evening the beam was seen again, though much less brilliant, in the same situation, but disappeared at once, and in a shorter time. This recurrence it was, which alone sanctioned the opinion of the *cometary* nature of the phenomenon; but I venture to ask, did any astronomer, any person of ordinary curiosity, ever witness the sudden disappearance of a comet, under circumstances wherein it could not be lost to sight by setting, or other cause of obscurity? On both occasions (and it never more was seen in our locality) the heavens were bright, the stars brilliant, and yet those stars remained visible long after the beam had disappeared. In a word, it had the character of a solitary ray of *aurora borealis* with parallel sides; and until some facts more corresponding with cometary aspects be brought forward, I am constrained to view it as an *electro-magnetic ray*, the first in order of those auroral manifestations, which prognosticated the deluges of cold swamping rain, that within two months changed the prospects of the harvest.

The barometer after the 12th continued to decline, with fluctuations, about what is usually marked the "changeable" point, to the end of the month, when I find it down to 29 in. 40 cents; and in the meantime the period of the vernal equinox occurred (22nd, 23rd), the mercury

then stood at 29 in. 30 cents, its greatest depression, wind south or south-east : rain fell in the night of the 22nd, otherwise the weather remained fine on the whole. Instead, however, of becoming warm and genial, the heat declined, fierce east winds came on, with much gloom, and at length after a frosty morning on the 29th, the current veered to south, then south-west, and the month terminated with profuse rain.

Such in Berkshire, in one of the most extensive wheat districts, was the state of the weather at the close of the critical month of March. The wheat on the rich lands was rich and beautiful, covering the surface in immense breadths with verdant herbage seven or eight inches high. The small quantity of spring wheat that was required, had been well sown, for the ground was in the finest condition : the *oats* also, of which a large proportion in this neighbourhood is the Tartary, were safe; and the land fully prepared for the approaching barley season; every thing belonging to the farm (if we except some indifferent clover) appeared a subject of delight and mutual congratulation, but as in all human affairs, *security* proved a serious delusion.

The monthly averages of temperature I registered—lowest $36\frac{1}{3}$, highest 50° —both a close approximation. The Norfolk table cites—lowest $36\frac{1}{10}$, highest $50\frac{8}{10}$; quantity of rain, 1.30 in.

April commenced well; the lowest average degree being 44, the maximum $58\frac{1}{2}^{\circ}$. For the first eight days, gentle showers, and one slight thunder-storm : wind south, S. W. to N. W. On the 9th, however, it veered to north-east, and the warmth declined rapidly, and on the 10th there was *snow*, with slight frost. 11th, lowest 29° —12th 28° —13th 31° —14th, with change of wind to S. W., slight melioration. The nights, however, never recovered their mild character, though from the 16th to 21st, we, in Berkshire, had mid-day temperature twice at 70° , and thence 67° , 68° . There were sixteen days in which south or westerly winds prevailed, and fourteen when they blew from some eastern quarter. The barometer never attained 30 inches but once, and for a few hours only, on the 16th.

A grand arch of *aurora borealis* illuminated the northern horizon about 9 and 10 o'clock, p.m., on the 5th day; and this phenomenon prognosticated the fatal change of the weather which was confirmed on the 10th.

Prior to that change, the crops were beautiful, the oats rising finely. I was in London during the period, and therefore could observe the extensive effects of the Siberian weather; for, not only were the streets and houses covered with snow on the 11th and 13th, but the wagons

and market-carts from all directions came in covered with thick hoar frost, while the water in the gutters was frozen quite solid. Nor was this to be wondered at; since the diary of the Chiswick Gardens registered 8 and 10 degrees of actual frost. Our locality, however, afforded no evidence of any similar depression, and by your Norfolk register I find the lowest quotation 30° Fahrenheit, the highest 70°, the general averages of the month being $41\frac{1}{2}$, and 58°. My totals give 39° for the nights, and 58° for the days. The gauged quantity of rain is estimated at $2\frac{1}{10}$ inches.

The first effects of the frost here, were perceived in a reddening of all the corn that was high above ground. When I returned in the fourth week, I saw those fine breadths of wheat which, on the 9th, were of the richest green, striped and blotched with buff: the blades had become an ugly resemblance of the striped-leaved feather grass, which is so ornamental in gardens. But in the present instance, disease, severe injury, were indicated, and from these the corn never recovered; a field of wheat so affected presented a singular spectacle, retaining its party colour, which underwent some deterioration with every advance of growth. In a word, the tissue was to a certain extent decomposed, and to that extent the constitutional strength of the plant affected. *All the best and rich lands suffered worst*, the corn upon the poor and late lands—wheat and oats—was comparatively little touched; and indeed the oats were not permanently blotched, and soon recovered from the first slight reddening.

Writers and reporters are rarely physiological observers: hence, not one remark upon the discoloration, or its prognostic; and yet every person saw and talked of the odd appearance of the plant. It becomes therefore a duty to impress the truth, that *if the leaves of any plant become seriously diseased, its fertility must be deranged*.*

May commenced here with fine weather, and a brisk drying wind; but on the 3rd a singular conformation of shell-like, dark groupings of clouds took place; and on the 6th, after profuse rain, there was a re-

* When I returned from London on the 26th April and observed the commencement of that striping and blotching, which indicated a corresponding and proportionate disease in the blades, I made a remark to a medical gentleman who has become one of our best farmers of many hundred acres, concerning the then visible effects of the late frosts and snow. He replied "I always think that a crop so affected, rarely quite recovers—we shall I think find this out at harvest."—He was right, for a disease of the foliage is equivalent to a derangement of some animal vital organ. It is on this ground that I ascribe all the subsequent debility of the best autumnal sown wheats to the decomposing power of 6 or 7° of frost, with powerful sunshine during day.—S. T.

petition of aurora borealis, very splendid in its northern arch, with singular fluctuations of bright auroral patches, resembling illuminated clouds, in various parts of the heavens. Sir John Herschel has commemorated this grand phenomenon, which assuredly established the rainy season that set in on the 8th. The remainder of the month proved ungenial and changeable. Thunder occurred on the 16th, 17th, and 23rd; and, with few exceptions, the weather was gloomy and rainy, the days almost sunless, and the nights chilly, from whatever quarter the wind might blow.

My averages of temperature were 45° by night, 60° maximum. The Norfolk table gives, night $45\frac{1}{6}$, day $63\frac{1}{6}$, quantity of rain nearly 4 inches.

The corn grew, but it was not strong, and the wheat showed the stripes and blotches more extensively.

June. They who were attached to a cool, moist, and windy month of May, had ample reason to be satisfied; but when the "rosy" June came in with clouds and gloom, and, during the first fortnight, drenched the already chilled ground with profuse rains, hail not being withheld, the staunchest admirers of the cold system began to quail. The wheat assumed a weak and spindling growth, the precursor of a speedy downfall; while hundreds of thistles and other aspiring weeds, that the farmer had in vain attempted to eradicate, were ready to overwhelm it. The meadow grass had also grown, and promised a superabundant yield; but in some lowlands (in Surrey and Sussex for instance) not only had breadths of it been buried in sand and earth, washed down by water, but great apprehension was entertained that were the wet season protracted, the bulk of the crop must perish.

Suddenly, however, after a completely wet day on the 14th, the wind became northerly, the 15th was dry, and on the 16th fine weather was established; and thence with scarcely a threat of change, the whole of the grass was cut, made, and ricked without a failure.

This circumstance was most propitious; still the temperature was too low to compensate for loss of time; therefore the wheat was not seen in flower generally, till the 21st or summer solstice.

The blotching and striping increased, in consequence of the drying up of the diseased portions of the blade, and the ears emerged weak and of small dimensions. *It now became certain that on those rich lands wheron a precocious vegetation had been excited, the disease of the leaf produced by the frost of April had proved a correct index of the deterioration of the spikes; for in the late sown and backward lands on which the verdure remained uninjured, the advancing ears were visibly superior.*

The Berkshire averages of temperature were $48\frac{1}{2}^{\circ}$ nights, $64\frac{1}{2}^{\circ}$ days; those of Norfolk $49\frac{2}{100}$ nights, $65\frac{4}{100}$ days. Rain during the month $1\frac{2}{100}$ in. It will now be interesting to corroborate what has been advanced, by the quotation of a few lines from the *Edinburgh Journal of Agriculture*—Report, p. 99, June.

“Another peculiarity of this season is the uninterrupted depression of the temperature. There have been no bursts of heat to encourage vegetation, and then returns of cold to check it; but cold, cold, *always cold*, whether with sunshine or clouds. This state of the air has had the effect of bringing forward the crop *unchecked*, in a gradual manner, and plants being subject to an equable temperature though low, have conformed themselves to the conditions, and are healthy, though of course much less advanced than at the same time last year, which was a period of heat and forwardness.”

July was warm upon the whole, the lowest temperature 40° and 45° being observed on the mornings of the 2nd and 24th. It was showery as usual, and particularly gloomy at the critical period of the third week, when the absence of sun was noted. This further retarded the harvest, and made the farmer solicitous as to the weather of the next, and only maturing harvest month that now remained. The barometer was below 30 inches till the 12th, it then rose to and a little above 30 in. till 19th, then fell and continued to be fluctuating about the changeable mark to the end, with the exception of the 25th-6th and 7th.

The mean of all the nights I registered about $58\frac{2}{3}$, of the day $71\frac{1}{3}$. In Norfolk the lowest average $54\frac{7}{100}$, days $72\frac{1}{100}$; rain by the gauge $2\frac{1}{100}$ in.

August. Wheat advanced, though always striped to a degree that people remarked how very odd was its appearance, not like any thing that it used to be. The pale hue of numbers of the smaller ears ($1\frac{1}{2}$ long—the largest were diminutive) began to be observed, and we soon begun to hear a good deal of “white blight.” On some pieces ten acres were stated to be almost without grain. All persons ascribed the presumed loss to bad weather at the period of flower; and no doubt the deluges of cold rain went far to produce debility; but the evil dated its origin in April. A little wheat was cut August 5th and 6th, and some oats on the 8th. Storms of thunder ravaged entire districts, but we escaped, hearing the distant peals for hours, yet not being visited even by one heavy shower. On the 9th it thundered for twelve hours, yet all the east of Berkshire appeared to be dry: hence our registers contain no items of much falling weather. The month closed superbly.

Average of all the nights $54\cdot7^{\circ}$, of days 72° , a close approximation to the Norfolk table, namely, $54\frac{2}{3}$, $72\frac{2}{3}$. Rain fallen is estimated at 5 inches: a volume which surely could only be ascribed to the storms.

September—beautiful, gorgeously sunny, beyond precedent, a month to be chronicled! My diary registers 70° to 79° during nineteen days of the first three weeks; and the averages of the nights and days could only have receded about 2° below those of August. The Norfolk table has—nights $52\frac{2}{3}$, days $69\frac{2}{3}$, rain not one inch. During this unexpectedly fine close of summer, the harvest was nearly completed. In the fine wheat districts of England, complaints became daily more frequent of short yield, small grain, and preponderance of tail. For the calculated deficiency, I shall soon appeal to the evidence kindly furnished by yourself, it being more definite than any data that I could collect from conversation with farmers, or from the interested documents of public reporters.

I was shown by a neighbour a sample of wheat, of which he had about 70 acres, upon which, while growing, he was complimented as altogether superior. To the flail it yielded, according to estimate, not quite so much grain as had been obtained from 50 acres in 1842. The last specimen he produced was what he called tail; it abounded in shrivelled grains scarcely fit for poultry, and just what I should have expected from a plant so blotched, so many abortions, or mere unimpregnated germs.

A party in North Wiltshire whom I have long known, wrote September 20, "I have reaped my wheat. The bulk of straw was never known so great here as it is this year; but according to the yield of the leasing corn, and some small lots that are thrashed, the produce in corn will be deficient, at least one-third when compared with last year."

It appears that in a broad belt of land of the best corn districts, extending far east and west of the metropolis, almost all the strong wheat was by the rains of May and June drawn up weak, then became lodged, and of course degraded. But *straw* was wanted, little or none remained, and that fetched an exorbitant price; the new straw was used even to thatch the ricks, and a vast supply remains. Hence we have a compensation, which, with a noble hay crop, and a fair yield of oats and barley, ought to satisfy us. Yet the farmer owes it to himself, and the community, to make every exertion to improve in his practice, in order to render the land more *early* and more *abundantly* productive.

By the estimate you favoured me with, rendered by a merchant of

Lynn, I fear we must include Norfolk among the injured districts; it appears that the average deficiency will scarcely be less than 4**lb** a bushel, the general run of his wheat being this year about 17 stone 4**lb** (14**lb** to the stone), while the same quantity last year would have averaged 18 stone 6 or 7**lb** to the coomb (or sack) of 4 imperial bushels.

As all persons compare the late results with that of 1842, when the straw was so short as to induce many to consider the sheaves and shocks as so many *heavy* dwarfs, I would call to mind the character of the month of May; it was hot and dry—none of your fine *cold* months. Yet then we had dole and sorrow in abundance, with lugubrious anticipations! Even the harvest during its progress was denounced. Now, however, we have found out that the *recolte* of 1842, as the French term it, was most excellent, sound, dry, ponderous!

October approached like summer—60° minimum, 67° maximum—fine and sunny. We hoped for a serene and lovely month: the winds wavered from west to south, east, thence to S. W., and on the 9th, a roll of thunder, long and protracted, from N. to S. E., through a dense series of horizontal clouds, brake up the weather, and introduced those profuse rains which at length saturated the land. The Norfolk table quotes $5\frac{2}{3}$ inches. With the thunder came in cold weather. Frost began on the 13th; and from 32° Fahrenheit the mercury receded to 25° on the 20th morning. 57° has since been the utmost maximum by day, and the averages are thus rated:—In Berks, nights 41·7°, days 54°; in Norfolk, nights $39\frac{6}{7}$, days 55°. It has frozen, by the thermometer on seven nights, but slight rime has appeared on the herbage more frequently.

Upon the whole, though by the contrast with its precursor it has been felt severely, October has proved a seasonable month. The plough could not work in the dried earth, and rain came. The earth then turned up mellow, and the wheat was deposited in a bed the most propitious to its germination. My neighbours have wisely been later than usual, and all boast of their doings; in fact, a finer seed-time was never seen. And by the Mark Lane Express of November 13, we read, that wheat sowing is nearly completed (not in the rich Isle of Thanet perhaps), and in many places the young corn is up, with a very healthy appearance.

Turnips in Berks are very tall in plant, some well bulbed; elsewhere the accounts are at variance. Potatoes are said to be rather short, but not so everywhere. We shall jog on pretty well, if we complain not

before we are hurt. Clovers have yielded (locally) a fine lattermath, wherever they give out for want of gypsum, and chalk is at hand. Nothing could be more easy than to prepare it artificially—by sprinkling diluted sulphuric acid over a layer of bruised chalk, turning, mixing, and sprinkling again. A few shillings would pay for the acid, and a few hundred weights of the sulphate of lime (artificial gypsum) would suffice to renew the soil of many acres which have been deprived of their native gypsum by the roots of those vegetables which require a supply of it.

In closing this retrospective article, which refers only to the period including the progress and harvesting of the agricultural crops of 1843, I refer once more to the Edinburgh Report of October 1st, in order to complete the chain of evidence.

“We can say with satisfaction, that since the 8th” (of August) “beyond the middle of September, the weather has been as clear, as warm, and as delightful as the most fastidious invalid could desire. The thermometer has ranged from 65° to 75° in the day, whilst it did not descend below 56° in the night, and the range of the barometer has not exceeded half an inch above or below 30 inches. The happy consequence of this improved state of the weather, is the hardening and ripening of all sorts of grain in an extraordinarily rapid degree, and these were the only results desired, as the grain had had sufficient time and moisture to be enlarged to its full size. In like manner, the leaves of the green crops have been invigorated and expanded to a degree of high health.

“After the wheat had fairly grown up in the spring, it was, in many instances, observed to be thin on the ground. Upon the whole, however, it is a fair crop in bulk; and there being a larger breadth sown this year than usual, there need be no apprehension of a deficiency of food.” “The quality cannot be so fine as the wheat of last year, though we have no doubt that some fine samples will be presented to the market.”

The *general* crop of barley is stated to be thick on the ground, though the sample will not weigh so heavy, or be so bright as that of last year. A greater breadth of oats was sown, and on dry friable soils the crop is excellent—as a whole, “there is a fair crop.”—*Journal of Agri., Oct.*, p. 203.

A friend in Scotland, and very competent judge, in a private letter wrote at the end of September, says, that the crops were nearly all *cut*,

and nearly all in good order—there had been a touch of frost, but for seven weeks the weather had been splendid, fine almost beyond precedent. The reports from Ireland I believe to be equally favourable. With every assurance of respect, I subscribe myself,

Dear Sir, your obedient servant,

JOHN TOWERS.

To Samuel Taylor, Esq.

ADDENDA BY MR. TAYLOR.

Mr. Towers having honoured me by addressing the above observations to me personally, and having still further indulged me by submitting the M.S. to my private perusal, my thanks are, in the first place, due to him for both acts of kindness; and in the next, some expression, however feeble, of my approval of his researches into a subject so little known and appreciated, as the science of meteorology.

In the outset, however, it behoves me to acknowledge in the most explicit and unreserved terms, my almost utter ignorance of the practical application of this otherwise interesting pursuit. Like many others, I have employed myself, particularly of late, in recording the atmospheric changes in my immediate neighbourhood, and duly registered the quantity of rain that has fallen in each month; but I am bound to state rather with a view to my own amusement, than to the hope or expectation of such observations being of any great public utility. Nor do I even now see any immediate prospect of turning them to any very important practical result. Let me not be misunderstood. I say not this to *discourage* these and similar pursuits, but, contrariwise, to stimulate to exertion those, to whom a residence and occupation in the country, afford so many opportunities of becoming acquainted with the general phenomena of nature. My ignorance is no excuse for the supineness of others; and nothing will afford me greater pleasure than directly, or indirectly, to be the means of removing it, and of converting what is generally regarded as a mere plaything, into something like usefulness. Nor would I confine my attention to mere atmospheric pursuits. The late Mr. Marsham, of Stratton Strawless, in this county, combined with these, a vast variety of facts in natural history, extending over a space of more than 50 years. These facts he collected and published on a single sheet; a plain unpretending statement, worth volumes of empty speculation. For my own part I never look at it without feelings of deep

interest and obligation to the collector of so much useful and agreeable matter. So of the late Gilbert White's *Selborne*; I defy any one at all used to the country and country scenes, even to dip occasionally into that book without being the wiser and the better for it.

But leaving these worthies, I return to *my* worthy—Mr. Towers.

We have it on good authority, that the knowledge of the cause of a disease is half the remedy. Now my indefatigable friend seems to trace the cause of much of the injury sustained by the wheat crop of last harvest, to the severe frosts in April; and in this opinion I am very much disposed to agree. Scarcely a year passes but we must have observed the effect of *late frosts* on plants previously in full, and perhaps unnatural exuberance. Let any one, for instance, carefully observe the stems of early potatoes, or the shoots of young asparagus, just after the attacks of one of these spring—I might almost call them, summer, frosts. Both will appear as if burnt; and though I don't mean to say that the wheat plant will be *equally* affected, yet when I reflect that it has been attacked when full of sap, and therefore comparatively tender, and peculiarly susceptible of injury from excessive cold, I cannot and do not wonder at the stripes and blotches on the stem and straw described by Mr. Towers; nor at the subsequent deficiency, which, unhappily, is found to exist in the yield and weight of the last wheat crop.

A singular instance of the disastrous effects of late *frost*, once occurred to myself in the case of a field of peas of about 20 acres, which being situated immediately in view of my house, I had perhaps devoted a little more than usual pains in rearing. By the aid of my friend Blackie's inverted horse hoes, I had in fact been able to convert the *field* into *garden* culture. A finer and cleaner tilth I never remember to have seen. The end of June was at hand—the crop was in full blossom. Not an insect was to be seen: and I began to hug myself into the belief that what every body said must be true, namely, that there were at least 10 coombs (40 bushels) an acre. The evening of the 30th June was suspiciously cold and clear. I had my fears of what was coming. About 3 o'clock in the morning I got up; there were my poor peas doing penance in a sheet of white frost; the whole field literally covered, as with lime dust. If I had published a list of errata for that year (1816), one of them would have run thus: for "40 bushels an acre," read 12. From the moment the frost attacked them, all vegetation was at a stand. The young shoots were literally nipt in the bud, and the plants swarmed with aphides. Now, there is reason to believe, that peas in their early state, will withstand a pretty severe frost. Indeed if they then sustain

injury at all, it chiefly arises from the mechanical action of frost nipping the tender stems, as in a vice. Nothing can be more hardy than the wheat plant during the winter months; and it is only in the event of an over-luxuriant growth, by which a redundancy of sap is supplied to the principal stems, that it is liable to be injured in the manner stated by Mr. Towers; and which injury he supposes to have taken place last April.

I cannot quit this part of the subject without referring to the admirable remarks of Dr. Lindley on temperature, in his "Theory of Horticulture," and I trust to be excused, both by Mr. Towers and the general reader, for transferring a passage or two, as more immediately bearing on the case before us.

"When, in the case of a given plant, the temperature is permanently maintained at a much higher degree than the species requires, it is over-excited. If the atmosphere is preserved in a proportional state of humidity, the tissue grows faster than the vital forces of the plant are capable of solidifying it, by the decomposition of carbonic acid, and by other means; its excitability is gradually expended, the whole of its organization becomes enfeebled, the vital functions are deranged, and a state of general debility is brought on. Such plants are soft and watery, with thin leaves, long joints, slender stems, and with no disposition to produce flowers. *A slight lowering of temperature affects them more than a much greater lowering would have done under other circumstances.* * * *"—pp. 83-84.

"An unnaturally low temperature is productive of evils of another kind. A certain amount of heat is necessary to each particular species, to enable it to grow at all; the immediate effect of heat being to rouse the vital forces, and to bring them into action. If the amount of heat to which a plant is exposed be sufficient to effect this purpose, the functions of the plant are natural and healthy: the consequence of exceeding it has been explained; those of diminishing it are not less disadvantageous. If the temperature to which a growing plant is exposed, is not lowered so much as to destroy it, but just reduced to that point within which it will continue to live, the plant is brought by the absence of a sufficient exciting cause, into a state not unlike that already described as resulting from over-excitement. It absorbs food from the earth and air, but it cannot assimilate it; its tissue grows, but it is not solidified by the incorporation of assimilated matter; aqueous particles accumulate in the interior, *a general yellowness ensues*, partly from the want of a sufficient power of decomposing carbonic acid, and partly from inability

to decompose the water collected in the interior. The consequence of this is a *want of the means of forming the usual secretions; flavour, sweetness, nutritive matter, are each diminished; and the power of flowering and fruiting is lost, probably from the absence of a sufficient secretion of organisable matter.*"—pp. 85-87.

So much for the effects of atmospheric changes on the vegetable world. Their effects on the human frame afford matter for every day gossip and speculation, at least in this variable climate of our's; for where is the Englishman, the Alpha and Omega of whose greetings are not of the weather, and its influence on his own and his neighbours' health? But how much of this is mere supposition; how little of practical science is ever brought to bear on the subject! I happen to be able to adduce a very important and valuable exception to this superficial mode of treatment of the question, in the person of H. W. Bailey, Esq., a medical practitioner of considerable eminence at Thetford, who, for the last 26 years, has recorded the temperature and atmospheric pressure three times in every day; pending to each month his own remarks, not only on the meteorological results thereby obtained, but combining with these, a concise, yet highly interesting retrospect of the diseases that have been most prevalent, and which, of course, have come under his immediate observation. Mr. Bailey has kindly favoured me with a sight of the last volume of his M.S. register, with permission to make such use of it, as may conduce to the object of this paper: a favour, of the value of which I hardly need add I am duly sensible, and only regret that time and space will not permit me so fully to avail myself of his kindness as my inclination prompts me to do.

Mr. Towers having referred to the sudden changes in April as the main causes of the injury to the then wheat crop, I am sure that to him at least, the following extract cannot fail to be highly interesting. Without further preface therefore, I subjoin Mr. Bailey's

"OBSERVATIONS FOR APRIL, 1843.

"The barometrical range for this month is not so fluctuating, considering the prevalence of the wind, being only 7—10½. The first week being wet with a high temperature, put new life into the vegetable world. All around smiled with luxurious verdure; but alas! it was not to continue. The following week was cold; and winter appeared to threaten us again with her snow-storms and frosty nights; thus destroying the tender buds and forward vegetation. The greatest quantity of rain, hail, and snow, fell during this time in the month. After which,

summer again appeared, bringing new life and spirits to all. On the 20th the temperature rose to 72°," (with me at 14 miles distance from Thetford, it was 70°,) "and to the end was between 50° and 60°. Highest point 72°, lowest 35°, mean 53½°.

Temperature on the Grass.

Highest.....46°
Lowest 23

Mean.....34½

Midnight Temperature.

Mean.....44°

Temperature in the Sun.

Highest 100°
Lowest.....51

Mean.....75½

SCALE OF WINDS.

	N.	N. E.	E.	S. E.	S.	S. W.	W.	N. W.	Calm.
Morning	2	3	5	2	6	3	4	3	2

Clear sky throughout the day 1
Fair, with modification of clouds.. 11
Overcast, without rain 2
Rain, fog, snow, and misty days.. 16

30 days.

Windy days.....21
Rain in inches 1.81
Mean of hygrometer.....44½

"DISEASES, &c., IN APRIL 1843.

"The fluctuations in the temperature of this month have given rise to very numerous cases of disease. The most prevalent is that of influenza, which, from newspaper reports, appears to be common throughout this kingdom. It commences with smart fever, great constriction throughout the thoracic region, distressing cough, and much pleurodynia of a wandering kind. The pulse was slightly accelerated, and not full, tongue white, and thirst intense. Skin not very hot, with frequent perspiration; bowels unusually relaxed; these symptoms continuing two or three days, after which, the expectoration becomes thick, and the symptoms subside, when convalescence takes place. * * *

"Fever of a low or typhoid kind has also been frequent among the lower classes, arising from the vicissitudes of the weather; and attacking those, unable, from low circumstances, to resist the effects of such changes. Coughs, sore throats, and rheumatism have also been more general from the same causes."—*H. W. Bailey.*

I cannot resist copying the following description of that very awful storm on the 9th August, by which so large a tract of country in Norfolk, Suffolk, and Cambridgeshire, was literally laid waste. It appeared at the time in the *Gardener's Gazette*, but will be new to many readers of this article.

"The morning," observes Mr. Bailey, "was splendid, cumuli floating

about in majestic style. Temperature at 9 o'clock 74°, wind full south; the heat rose to 84°, and about two p. m. the wind changed due N., and at four p. m. to N.E. The clouds accumulated, manifesting great electricity. The temperature at this time fell 10 degrees. At five o'clock a most dense black cloud was seen from the S., with lightning, and constant distant thunder, which gradually approached us. The lightning and thunder were awful, together with the immense hailstones and large pieces of ice, with such torrents of rain as were never before remembered. The storm lasted twenty minutes, flooding every street, and inundating the ground-floors of very many houses. The damage done to the windows was most extraordinary, besides washing down banks and old walls, as well as killing many small birds. In the neighbourhood very great damage was done to the standing corn, literally threshing it to a great extent, besides sweeping away acres of turnips. During the next day were seen large heaps of hailstones and pieces of ice under the hedges, and among the corn. The violence of the storm was such, and the torrents of rain so great, that my rain-gauge ran over, so that the exact quantity of rain fallen could not be told, but upon measuring the gauge when full, I ascertained that five inches was the amount, besides what overflowed; a quantity rarely, if ever, known to have fallen in so short a space of time in this country."

To show the partial operation of the storm, the quantity indicated by my rain-gauge (one of Tagliabue & Cassella's) was only 1·89, and no hail whatever! The total amount during the month, indeed, was only 5·06 inches. In Berkshire, according to Mr. Towers's account, they had neither storm nor downfall of any kind.

The interest which this subject never fails to awaken in my mind, has, I fear, led me to transgress the limits I had originally assigned to it. With these remarks I shall conclude what I have to say in the way of addenda to Mr. Towers. Hoping that, between us, we may have succeeded in awakening attention to the subject of meteorology in general, and particularly as applied to the year just past,

I remain, Mr. Editor,

Your's very truly,

SAMUEL TAYLOR.

SMITHFIELD CLUB CHRISTMAS CATTLE SHOW.

Award of Prizes and Medals for 1843.

OXEN.

CLASS I—Oxen or Steers of any breed, under 5 years of age, without restrictions as to feeding, yet the kind or kinds of food must be certified.

Mr. Robert Burgess, Cotgrove-place, Notts, a 3 years and 8½ months old Durham ox, bred by himself, from the stock of Earl Spencer, and fed on grass, vetches, hay, clover, cabbages, turnips, oil-cake, and boiled barley. Travelled by van 6 miles, and by railway 130. The third prize of £10.

Earl Spencer, a 4 years and 6 months old Durham ox, bred by his lordship, and fed on swedes, mangel wurzel, cabbages, hay, oil-cake, and bean-meal. By van 10 miles, by railway 66. The first prize of £20 and a silver medal.

Mr. J. Watson, Thorney, near Peterborough, a 4 years and 8½ months old Hereford ox, bred by Mr. C. Blakenay, near Ludlow, and fed on hay, cake, barley and bean-meal, linseed, tares, carrots and cabbages. By van 31 miles, by railway 95. The second prize of £15.

CLASS II—Oxen or Steers, of any breed, under 6 years of age, weight 90 stone and upwards, that shall not have had cake, corn, meal, seeds, grains, or distillers' wash, during 12 months previous to the 1st of August, 1843.

Mr. J. Beazley, near Northampton, a 4 years and 8 months old short-horned ox, bred by himself, from a bull of Earl Spencer, and fed on mangel wurzel, turnips, hay, and 1770 lbs. of oil-cake. By van 10 miles, by railway 60. The first prize of £30 and a silver medal.

Mr. A. Perkins, Arnesby, near Leicester, a 4 years and 11 months old Hereford ox, bred by Mr. J. Williams, of Kingsland, near Leominster, and fed on grass, hay, turnips, and 1200 lbs. of oil-cake. On foot 9 miles, by railway 100. The second prize of £20.

Earl of Warwick, a 4 years and 8 months old Hereford ox, bred by Mr. W. Perry, Monkland, near Leominster, and fed on grass, hay, turnips, potatoes, 951 lbs. of cake, 450 lbs. of barley-meal, and 390 lbs. of bean-meal. By van 11 miles, and by railway 84. The third prize of £100.

CLASS III—Oxen or Steers of any breed, under 5 years of age, under 100 stone and above 70 stone weight, that shall not have had cake, corn, meal, seeds, grains, or distillers' wash, during 12 months previous to the 1st of August, 1843.

Mr. J. T. Senior, Broughton-house, near Aylesbury, a 3 years and 6 months old Hereford steer, bred by Mr. P. Stephens, of Hampton, near Kington, and fed on grass, hay, and 730 lbs. of cake. By railway 50 miles. The second prize of £10.

Mr. T. Umbers, Wappenbury, a 3 years and 7 months old North Devon steer, bred by himself, and fed on grass, hay, turnips, 850 lbs. of cake, and 800 lbs. of barley and bean-meal. On foot 9 miles, by railway 83. The first prize of £15 and a silver medal.

CLASS IV—Oxen or Steers of any breed, not exceeding $4\frac{1}{2}$ years of age, under 85 stone weight, that shall not have had cake, corn, meal, seeds, grains, or distillers' wash, during 12 months previous to the 1st of August, 1843.

Mr. T. Umbers, Wappenbury, a 3 years and 6 months old North Devon steer, bred by himself, and fed on grass, hay, turnips, 850 lbs. of cake, and 800 lbs. of barley and bean-meal. On foot 9 miles, by railway 83. The first prize of £10 and a silver medal.

Sir W. Wake, Bart., Courteen-hall, a 3 years and 8 months old Hereford steer, bred by Mr. J. Williams, Staunton-upon-Wye, and fed on grass, hay, mangel wurzel, turnips, carrots, and 1098 lbs. of cake. On foot 1 mile, by railway 60. The second prize of £5.

CLASS V—Oxen or Steers of any breed, under $4\frac{1}{2}$ years of age, under 80 stone weight, without restrictions as to feeding, yet the kind or kinds of food must be specified.

Mr. T. Bridge, Buttsbury, near Ingatestone, a 3 years and 11 months old Hereford steer, bred by Mr. Arden of the Ley, near Weobly, and fed on vegetable roots, grass, hay, oil-cake, and bean-meal. By van 28 miles. The prize of £10 and a silver medal.

COWS.

CLASS VI—Fattened Cows or Heifers, under 5 years of age. Freemartins and spayed Heifers are not qualified.

Sir C. Tempest, Bart., Broughton-hall, a 4 years and 9 months old short-horned heifer, bred by himself, and fed on hay, cake and turnips. By van 30 miles, by railway 196. The first prize of £20, a silver medal, and a gold medal.

The Hon. H. W. Wilson, Keythorpe-hall, near Leicester, a 2 years and 11 months old short-horned and Ayrshire heifer, bred by himself, and fed on cake, barley-meal, beans, peas, hay, and vegetables. By van 30 miles, by railway about 100. Third prize of £5.

CLASS VII—Fattened Cows, of 5 years old and upwards. Freemartins and spayed Heifers are not qualified.

Mr. Barnett, Stratton-park, near Biggleswade, a 5 years and 6 months old Durham cow, had one calf, bred by himself, and fed on grass, hay, oil-cake, linseed and bean-meal, and carrots. By van 45 miles. The first prize of £20 and a silver medal.

Mr. J. T. Smith, Thornby Grange, near Northampton, a 5 years and 2 months old short-horned heifer, bred by Mr. Cook, Cunnington, and fed on cake, bean-meal, carrots, and hay. On foot 5 miles, and by railway 78. The second prize of £5.

CLASS VIII—Fattened Cows, of 5 years old and upwards, that shall have had at least two live calves at separate births.

Marquis of Exeter, a 7 years and 2 months old Durham cow, had two calves, bred by himself, and fed on oil-cake, barley-meal, and turnips. By van 84 miles. The second prize of £5.

Mr. E. Lakin, Beauchamp-court, near Worcester, an 11 years and 9 months old short-horned cow, had six calves, bred by himself, and fed on hay, grass, vetches, straw, cabbages, turnips, mangel wurzel, potatoes, oil-cake, and bean-meal. By van 9 miles, by railway 140. The first prize of £20 and a silver medal.

SHEEP.

CLASS IX—Long-woolled fat wether Sheep, 1 year old, that have never had cake, corn, meal, seeds, or pulse.

Mr. T. Twitchell, Willington, Beds., a pen of three 20 months old Leicester wethers, bred by himself, from rams hired of Mr. S. Bennett, Bickering's-park, Woburn. The first prize of £20 and a silver medal.

Mr. T. Umbers, Wappenbury, near Royal Leamington Spa, a pen of three 20 months old new Leicester wethers, bred by himself, from rams hired of Mr. W. Umbers, jun., and Mr. J. Buckley. The second prize of £5.

CLASS X—Long-woolled fat wether sheep, 1 year old, under 8 stone weight, that have never had cake, corn, meal, seeds, or pulse.

Mr. J. S. Burgess, of Holme Pierrepont, near Nottingham, a pen of three 20 months old long-woolled wethers, bred by himself. The prize of £10 and a silver medal.

CLASS XI—Long-woolled fat wether Sheep, 1 year old, without restrictions as to feeding.

Mr. W. Sandy, of Holme Pierrepont, near Nottingham, a pen of three 20 months old long-woolled wethers, bred by himself. The second prize of £5.

Mr. T. Twitchell, Willington, near Bedford, a pen of three 20 months old Leicester wethers, bred by himself, from rams hired of Mr. S. Bennett. The first prize of £20, a silver medal, and a gold medal.

CLASS XII—Long and short-woolled cross-bred fat wether Sheep, 1 year old, without restrictions as to feeding.

Duke of Manchester, a pen of three 21 months old Southdown and Leicester cross wethers, bred by Mr. G. Edie, Wytonhill-lodge, near Huntingdon, from rams of his grace. The second prize of £5.

Mr. C. Tomson, Sundon, Bedfordshire, a pen of three 21 months old Down and Gloucester cross wethers, bred by himself. The first prize of £10 and a silver medal.

EXTRA STOCK.—LONG-WOOLLED SHEEP.

Mr. C. Large, Broadwell, near Burford, a 56 months old long-woolled ewe, bred by himself. A silver medal.

CLASS XIII—Short-woolled fat wether Sheep, 1 year old, without restrictions as to feeding.

Mr. Grantham, near Lewes, a pen of three 20 months old Southdown wethers, bred by himself. The first prize of £20, a silver medal, and a gold medal.

Mr. S. Webb, of Babraham, a pen of three 20 months old Southdown wethers, bred by himself. The second prize of £5.

CLASS XIV—Short-woolled fat wether Sheep, 1 year old, under 8 stone weight,
• without restrictions as to feeding.

Mr. S. Webb, of Babraham, a pen of 20 months old Southdown wethers, bred by himself. The prize of £10 and a silver medal.

CLASS XV—Short woolled fat wether Sheep, 2 years old, without restrictions as to feeding.

Mr. Grantham, near Lewes, a pen of three 20 months old Southdown wethers, bred by himself. The first prize of £20 and a silver medal.

Mr. S. Webb, of Babraham, near Cambridge, a pen of three 32 months old Southdown wethers, bred by Mr. H. J. Adean, of Babraham. The second prize of £5.

EXTRA STOCK.—SHORT-WOOLLED SHEEP.

Mr. W. B. Harris, of Hinton-farm, Abingdon, a 7 years and 9 months old Southdown ewe, bred by himself. A silver medal.

PIGS.

CLASS XVI.—Pigs of any breed, above 13 and under 26 weeks old.

Mr. W. Lobman, Ewell-marsh Farm, near Epsom, a pen of three 24 weeks and 5 days old Neapolitan pigs, bred by himself, and fed on peas, barley-meal, and middlings. The prize of £10 and a silver medal.

CLASS XVII—Pigs of any breed, above 26 and under 52 weeks old.

Mr. W. F. Hobbs, Markshall, near Coggeshall, a pen of three 30 weeks and 6 days old improved Essex pigs, bred by himself, and fed on peas, barley-meal, and steamed potatoes, mangel wurzel, and milk. The first prize of 10 sovereigns, and a silver medal in class 17 as the breeder.

Lord Western, a pen of three 27 weeks and 2 days old improved Essex pigs, bred by his lordship, and fed on barley-meal and beans. The second prize of £5.

EXTRA STOCK.—PIGS.

Lord Western, a 27 weeks old improved Essex pig, bred by his lordship, and fed on barley-meal and beans. A silver medal.

HUMPHREY GIBBS, Hon. Secretary.



EXPERIMENTS TRIED UPON WHEAT,

In the Garden of the Horticultural Society, at Chiswick, in 1843.

	State of Crops in June, 1843.	Pounds of Grain in Sept.	Weight of Straw in Sept.		
			Tons.	Cwt.	Lbs.
1.—Phosphate of ammonia	Good	1701	3	0	80
2.—Ditto and silicate of potash ..	Ditto	1048	3	4	105
3.—Sulphate of soda	Very bad	1302	1	15	10
4.—Ditto and silicate of potash ..	Ditto	1402	2	13	62
5.—Common salt	Bad	2087	2	14	0
6.—Ditto and silicate of potash ..	Ditto	1313	2	12	37
7.—Muriate of ammonia	Very good	2015	2	13	86
8.—Ditto and silicate of potash ..	Ditto	1680	4	17	12
9.—Phosphate of lime	Bad	1799	2	10	32
10.—Ditto and silicate of potash ..	Ditto	1829	2	15	105
11.—Muriate of potash	Indifferent	2153	2	16	75
12.—Ditto and silicate of potash ..	Ditto	1592	3	7	94
13.—Nothing.	Bad	1218	2	3	7
14.—Ditto and silicate of potash ..	Ditto	1476	2	8	62
15.—Sulphate of lime	Good	2246	2	19	8
16.—Ditto and silicate of potash ..	Ditto	2277	3	13	107
17.—Sulphate of ammonia.....	Very good	1986	2	19	26
18.—Ditto and silicate of potash ..	Ditto	1877	3	5	100
19.—Sulphate of magnesia.....	Indifferent	1921	2	13	100
20.—Ditto and silicate of potash ..	Ditto	1969	3	2	15
21.—Sulphate of potash	Ditto	1714	2	3	107
22.—Ditto and silicate of potash ..	Ditto	2150	3	18	64
23.—Nitrate of soda.....	Ditto	1864	2	19	70
24.—Ditto and silicate of potash ..	Ditto	1519	3	0	46

When I saw the above on the 30th of June, 1843, I was told, that the wheat was of the kind called Talavera; that it had been sown in the previous April, in regular drills; and that the various salts had been scattered over the beds in equal quantities, as the wheat began to make its appearance above ground. That plot manured with sulphate of lime had only recently acquired its healthy appearance; while that manured with nitrate of soda had looked well at first, but had gone off much before the period at which I saw it. It must be borne in mind, that the months of May and June, 1843, were more than usually wet.

LITERARY NOTICE.

The following address has been printed, and sent to a number of persons, who, it is hoped, will kindly endeavour to promote the object in view.

"*The Arboretum et Fruticetum Britannicum*," in 8 vols. 8vo, 4 of letterpress and 4 of plates. Price £10. With upwards of 2000 woodcuts interspersed with the letterpress.

N.B. The plates, if required, will be sold by themselves, but the letterpress will not be sold without the plates. The reason is, that any number of impressions may be taken from the plates whenever they are wanted; whereas the letterpress not being stereotyped, there are of it but a limited number of copies, which cannot be increased.

The plates by themselves will be of great use to landscape artists, to the pupils in schools of design, and to all persons learning to draw trees.

A new impression of the four volumes of the plates of this work being about to be issued, with certain corrections which, in the original edition, could only be put in the list of errata, the author, with the approbation of his publishers and friends, thinks it may contribute to the sale of the work to make the following statement.

The *Arboretum Britannicum* was got up between the years 1833 and 1838, and published on Mr. Loudon's own account at an expense of upwards of £10,000. The greater part of this sum was owing at the completion of the work; but it sold so well, till the late depression of the book trade in 1841, that only about £2,600 of the debt remained to be paid off at the end of that year. It is, however, necessary to observe, that this large proportion of the debt was not paid off solely by the produce of the *Arboretum*, but in part by the profits of Mr. Loudon's other literary property, consisting of thirteen different publications, all of which stand pledged in the hands of his publishers, Messrs. Longman, for the debt on the *Arboretum*. This debt, at the present time, amounts to about £2,400; and hence, if 350 additional subscribers could be got, the debt would be at once liquidated, the works pledged for it set free, and Mr. Loudon or his family would enjoy the whole produce of his literary property.*

* It may be thought, from the well-known extensive sale, for the last twenty years, of Mr. Loudon's publications, that he ought now to be independent; but, in consequence of too intense application while compiling the *Encyclopædia of Gardening*, Mr. Loudon fell into ill health in 1821, which obliged him ultimately to have his right arm ampu-

This appeal would never have been made, had not Mr. Loudon, who has been an invalid for several years, been lately seized with an inflammation of the lungs, terminating in chronic bronchitis, which, even if the disease should be considerably alleviated, will effectually prevent him from any longer pursuing his profession of landscape-gardener, on the produce of which profession, and on the literary labours of Mrs. Loudon, he has entirely depended for his income, since his literary property was pledged for the *Arboretum*. Under these circumstances Mr. Loudon feels himself justified in taking this mode of soliciting additional subscribers to the *Arboretum*, and in begging his friends and patrons throughout the country to assist him in obtaining them.

The *Arboretum* has been spoken of in the highest terms in all the principal Reviews of Europe, and in the Botanical Periodicals of North America. The *Quarterly Review* says :—

“This book is one of solid value, worthy of a place in the library of every landed gentleman, as well as of every student of botanical, arboricultural, and horticultural science. . . . Let us warmly congratulate Mr. Loudon on having finished his Herculean task ; a task which few men, except himself, would have had the courage to begin, and still fewer the perseverance to complete. The *Arboretum Britannicum* is complete in its kind, and it must become a standard book of reference on all subjects connected with trees.”—Oct. 1838.

If, then, the *Arboretum* is “worthy of a place in the library of every landed gentleman,” it may be permitted to its author, under his particular circumstances, to direct the attention of landed gentlemen to the book. Surely there must be more than 350 hereditary libraries that do not yet contain the work ; not to mention the libraries which some gentlemen devote to their gardeners, foresters, and bailiffs, in which the *Arboretum* will be found a most useful acquisition.

The following ladies, noblemen, and gentlemen, who already possess the work, on being applied to, have kindly permitted their names to be published as approving of the *Arboretum*, and of this address to the public :—

tated, his left hand being at the same time so much injured as to leave him with only the partial use of two fingers, and his left knee being ankylosed. In consequence of these bodily infirmities, Mr. Loudon has been obliged to keep an amanuensis and a draughtsman for the last twenty years, and also a servant to act as valet ; and, had it not been for the expenses thus incurred, and others arising from the same source, he might have been now independent, even without his literary property. This explanation is due to those who are ignorant of Mr. Loudon’s personal character.

The Right Honourable Lady Rolle.	Sir H. E. Bunbury.
Mrs. Lawrence of Studley Royal.	Sir Charles Lemon.
The Duke of Northumberland.	Sir Oswald Mosley.
The Duke of Devonshire.	Sir William Jardine.
The Duke of Buccleuch.	Sir W. J. Hooker.
The Duke of Sutherland.	The Rev. J. Mitford.
The Marquess of Northampton.	The Rev. M. J. Berkeley.
The Earl of Shrewsbury.	The Rev. W. T. Bree.
The Earl of Aberdeen.	Captain Widdrington, R.N.
The Earl of Harrington.	J. T. Brooks, Esq., Flitwick House.
The Earl Fitzwilliam.	Joseph Strutt, Esq., Derby.
The Earl of Radnor.	L. W. Dillwyn, Esq., Sketty Hall.
The Earl of Ripon.	Gregory Gregory, Esq., Harlaxton Manor.
The Earl of Lovelace.	P. J. Selby, Esq., Twizell House.
Viscount Combermere.	Professor Henslow.
The Bishop of Winchester.	Professor Lindley.
Lord Monteagle.	Professor Royle.
Lord Corehouse.	Dr. Neill.
Sir John Trevelyan.	

Some of the above noblemen and gentlemen have, unasked, kindly sent us testimonials evincing their very favourable opinion of the *Arboretum*, and these we shall probably publish in our next Number.

We have also received some additional subscribers, among whom are Joseph Strutt, Esq., of Derby, for ten copies, and Mrs. Lawrence of Studley Royal, one copy. Mr. Strutt took a still greater number of copies when the work was first published.—*Gardener's Magazine*.

THE NEW POOR LAWS, &c.

SIR,—You have inserted for me a letter on the subject of an Annuity Scheme, which, I think, if carried into practice, would have a beneficial influence on society; and, as your periodical is extensively circulated among landlords and farmers, who, as a body, have a great interest in the poor laws of the kingdom, I make bold to offer you some remarks on that subject.

Whatever is thought of the New Poor Law, it is preposterous to expect it will be repealed; but it is not improbable, that by well-directed efforts against its obnoxious clauses, it might be much modified for the

better, as it is likely its most strenuous supporters will not say it was a perfect measure. Having had some experience in the working of the old Poor Law, in a heavily burthened district, I will venture some suggestions with that view. I was, and am decidedly opposed to making up the wages of labour with the poor-rates. Notwithstanding, I consider the New Poor Law was passed from reasoning on extreme cases, and that some of its enactments and practice, in consequence, are on wrong assumption. First, that the restraints of the Union House are not sufficiently discouraging and stringent to prevent young persons from taking up their abode there; but that it is necessary to outrage the best feelings of our nature, by separating the husband from the wife, and the children from the mother: next, that we cannot afford to give them separate rooms. That is wrong assumption; for under the old law we found them separate houses, when the poor-rate probably bore a greater proportion to the wealth of the country than it does in the present day. In the parish I live in, I paid in one year £1 17s. 6d. per acre poor-rate; yet I think the farmers are as well off in the present day as their neighbours who paid less. The poor-rate involves the question of the just distribution of the wealth of the country; yet it will not do to reason too rigidly on the subject, for we see much wealth distributed by entails, and circumstances we have no influence over, much by fraud and violence, much by laws and institutions of questionable utility, and others are maintained without performing service; and it should be borne in mind, that the poor are necessarily nearest the verge of distress. The suggestions I beg to offer for a modification of the Poor Laws are, first, that families should not be separated on coming into the Union House; for it is outraging the best feelings of our nature, which must redound in some way to the injury of society, as all excessive punishments must do: next, that no man should be obliged to go into the Union House until he had been relieved, according to the old law, to a certain amount—say £10, or half a year's hire; but if he could do without relief until 60, that he should not be obliged to go to the Union House during life; and I would attach the same privilege to persons who repaid the money. Were we to reflect what the practice was under the old Poor Law, and that the new law was passed without regard to prescriptive rights, which are held so sacred in this country, in the cases of other ranks of society, it appears extremely harsh for the present generation, that there should be no alternative between no relief and the Union House. Another suggestion I beg to make, is different in principle—that 5 per cent annually of the poor-rate might be called for,

to meet casualties, and be at the disposal of the overseer, and those who would add to the amount by subscription. That it was blended with charity, might keep some from unnecessarily availing themselves of it; at the same time, in large towns it is likely, that by such a provision a body of humane and intelligent persons might be called into action. And, besides, if such a fund were left entirely to local control, possibly light might be elicited from the workings of two systems. The Bastardy Law being unjust and partial, should be amended. Our statistics give some insight as to the number of insane persons in the kingdom; and the treatment of such persons being far from what it should be, why do not the government divide the country into districts, and appeal to the charity of the landed proprietors, and begin to build where they got the land gratuitously? Of course it would be necessary that asylums should be within convenient distances of considerable towns, to obtain medical assistance, and for other reasons. To meet the interest of the money borrowed for building asylums, surely could not be a very great charge, for it would fall on counties.

I do not see how the working classes are to command medical assistance, but by co-operation, and the principle of mutual assurance. Taking a rough estimate of illness, at one week in fifty-two, say that medical attendance on each family is worth 6s. annually; but there would be a difficulty in getting such a number to unite and pay regularly, as to make it worth a medical man's while to depend on such a practice. The way that appears to me likely to bring such a scheme into practice, would be, that government should engage to pay a bounty, say £100, for some years in large towns, to a medical man who would exclusively devote himself to such a practice. It may be observed, that society must possess knowledge, and form habits, before they can profit from institutions. I question religiously the right of any man to take the labour of another for half-wages, under the plea that there is a redundancy of labour in the market, and divide the wages of one among two, and say that half a loaf is better than no bread. I question the right of union houses, schools, jails, or any such institutions, making any marketable work. Work, in such places, when it is not for themselves, should be work of instruction, even if they did to undo, or for employment, such as grinding with small mills, preparing oats for food on small stones, hoeing, and digging, &c.—I am, sir, your obedient servant,

CADOGAN WILLIAMS.

BRIDGEND, December, 1843.

ON THE EVILS OF PRESERVING GAME.

SIR,

As an enemy to the overzeal with which game is preserved in some counties, both by landlords and gamekeepers, allow me to point out one of the evils arising indirectly therefrom, which hitherto appears to me either to have been entirely overlooked, or not to have received the attention it deserves. I allude to the late alarming increase of rats in and about farm premises. Many an acre of wheat has been destroyed by these marauders; and never perhaps in the memory of man have they been seen in such numbers as in the present season. Several farms in my immediate neighbourhood can reckon their thousands slain "in the field"; yet the whole country teems with them. Many people are disposed to treat the newspaper tales we have lately read of them and their doings as so many pleasant fictions; but my own opinion is that they are strictly true. And why not? There is nothing either impossible or improbable in the increase of their numbers, enormous and alarming as I admit it to be.

"It were loss of time," says Mr. Waterton, speaking of the common rat, "to dwell on its fecundity. Nine or ten young ones at a time, twice or thrice during the year, are an enormous increase, and must naturally recall to our minds one of the many plagues which formerly desolated the fertile land of Egypt."—*Waterton's Essays*, p. 213.

But why this increase in the present, more than in any former year? Because of the *game preserving mania*. Every gamekeeper partly out of his own wisdom, and partly with a view to the favour of his employer, forms to himself a sort of annual garland of all the fowls of the air and beasts of the field, which he is pleased to designate as vermin—i. e., enemies of the game—and there, strung together by hundreds, may be seen, and when the wind lies right, *smelt*, an ostentatious display of stoats, weazels, carrion crows, owls, and other such depredators, who, whatever may be their natural relish for pheasants and partridges, have a not less decided *penchant* for rats and mice. Now it is very clear if all these enemies of the game are put out of the way, the game will increase; but for the same reason, only perhaps in much larger ratio, so will the tribe of rats and mice. As to the poor barn owl, her fate is not less inhuman than unmerited.

"If" says Mr. Waterton, "this useful bird caught its food by day instead of hunting for it by night, mankind would have ocular demonstration of its utility in thinning the country of mice; and it would be

protected and encouraged everywhere. It would be with us what the Ibis was with the Egyptians. When it has young, it will bring a mouse to the nest about every twelve or fifteen minutes. But in order to have a proper idea of the enormous quantity of mice which this bird destroys, we must examine the pellets which it ejects from its stomach in the place of its retreat. Every pellet contains from four to seven skeletons of mice. In sixteen months from the time that the apartment of the owl on my old gateway was cleaned out, there ~~has~~ been a deposit of above a bushel of pellets."—*Essays*, p. 13.

Mr. Waterton encouraged a pair to build and breed in this same gateway. "I threatened," says he, "to strangle the keeper, if ever, after this, he molested either the old birds, or their young ones."

"The barn owl," he also observes, "sometimes carries off rats. One evening I was sitting under a shed, and killed a very large rat as it was coming out of a hole, about ten yards from where I was watching it. I did not go to take it up, hoping to get another. As it lay there, a barn owl pounced upon it and flew away with it."—*Essay*, p. 13.

So long as gamekeepers are encouraged by pecuniary or other motives, to destroy whatever they in the plenitude of their ignorance fancy to be obnoxious to them and their interests, so long must we expect to be annoyed with the plague of rats. These things, after all, are ordered for us in a wiser and better way than we can order them ourselves; for in remedying one evil, we not unfrequently create a much greater. Like the man who inclosed his whole garden with netting to keep out the birds; an object which he undoubtedly effected; but at what expense? His entire produce was devoured by insects, which the poor calumniated birds would have prevented, at the cost, probably, of an insignificant portion of it to their own share.

FAIR PLAY.

December 16, 1843.

THE PROVISION TRADE WITH ENGLAND.

[The following letter on the Provision Trade between England and America is from the "American Agriculturist", a well-conducted monthly publication. The writer of it came to England expressly to acquire a knowledge of our manner of sending agricultural produce to market.]

Experience begins to show that the provision trade with England must be the great trade of the country. She must, within a very few years, draw a large share of her supply of *cured* provisions from Ame-

rica, and in a great degree from the United States. As the whole subject of the provision trade is new in this country, I propose to give some hints on the best method of sending out, and selling in English markets. On a former occasion, as you are aware, I published the method of curing and preparing pork and beef. The article was extensively circulated, and I trust did a good deal of service. In this article I shall confine myself principally to butter, cheese, and lard.

Butter.—Until there is more system in the method of putting up, and care in making, butter can not be sent into the English market with any degree of safety, except as grease-butter; and as that must be bought at a very low rate in your market, say upon an average of four cents, to pay the shipper a profit, it follows, that as we now do business, our butter must be consumed at home. I should not recommend any person to ship, until there is a modification of the tariff, so that butter can go in at a much smaller duty than is now levied. If our farmers would only take pains in putting up their butter, it would make a difference of a great many hundred thousand dollars with their profits. If they would work out all the milk, salt with pure salt, and put up in firkins made of thoroughly-seasoned oak, there would be no difficulty in having it keep well in any climate, and insure for it a ready sale.

Cheese.—This will soon become quite an article of traffic, and the American article may in a great measure take the lead in the English market. It is so cheaply made in our dry climate, and can be so soon cured, and sent into market, that the farmer will find it the most profitable of his dairy products. Here, however, great care is required, or he will lose. The cheese must not be too large; from 40 to 50 lbs. when well cured is the favourite size; and they must be deep, mildly flavoured, well pressed, and so cured as to keep their shape. A great deal of cheese is spoiled upon the voyage, simply because the whey has not all been pressed out. The hold of a ship is generally very warm, and the cheese gets heated, and unless well cured, materially injured. In preparing it for market, casks are preferable to boxes, because it will keep quite as well if properly packed, and saves expense, as each package has to be weighed into the custom-house, and it costs as much to weigh a box as a cask, besides it is easier handled in casks. In packing it into casks two things are of prime importance. 1. That all the cheese in the cask be as near alike as possible in colour, taste, and weight. 2. That there should be a thin board, the size of the cheese, between each one. Half-inch would be thick enough. Some put only a narrow strip of board, but this indents itself into the cheese, and injures them. When nothing

is put between them, the cheese get stuck together, and are injured in separating.

Lard.—Lard is worth so much for oil, and oil is in such good demand, that the export will cease in a short time, or nearly so. A good article of bladdered lard will generally pay. Sometimes also in kegs, and a very fair article in barrels. The bladders should be hogs' bladders, and cleaned when taken from the hog. The process is very simple. The bladder is first blown to its utmost capacity, then turned, washed, returned, and put into a strong clear brine for twenty-four hours; changed again into fresh brine, and in about two days it will be bleached perfectly white, and the end sufficiently cured to keep after the bladder is filled. Much depends on getting the bladder well bleached. When filled, it is turned inside out, suspended in a tub of cold water, and filled from a cask into which the lard has been strained long enough to get below the boiling point. As soon as filled it is tied up, and thrown into a large vat of cold water to cool. When put up for market, casks of the size of flax-seed tierces should be used, smaller would be preferable, and the bladders carefully packed between and among layers of clean chaff. In Ireland they use oat-hulls. Great care should be taken that they are kept dry, and do not get burst in the package. None but the very best lard should be put into bladders.

Method of Selling.—The manner of doing business now is to consign the article to some house in Liverpool. After the consignment has come to hand, it is in due time landed, weighed, &c., and taken into the custom-house if bonded, which is the usual course. The consignee employs a broker to sell. He advertises it for sale at public auction, at some future day. In due time it is put up and sold.

Some little experience in that market satisfies me such is not the best way. Nine times in ten it is in the power of a few dealers to combine and have it at their own price. Besides, the expenses are materially enhanced—because you are compelled to pay all the broker's charges extra. The true way for American dealers is to establish an agent in Liverpool or London, to whom they should send their consignments. He could push them into the market as the price would warrant, and in a very little time have his channels, which would be sure and safe. Until such a thing is done, our people will do business very much to a disadvantage.

T. C. PETERS.

DARIEN, October 2, 1843.

EXPERIMENTS WITH VARIOUS MANURES.

SIR,

I beg to furnish you with the following interesting account of Experiments with various Manures on Potatoes, Turnips, and Mangel Wurzel, as its publicity in your periodical may prove serviceable to the agricultural community.—Yours, truly,

C.

Produce of 40 Square Yards.

POTATOES.			Lbs.
At the rate of 25 tons of farm-yard muck $\frac{1}{2}$ statute acre			234
8 cwt. of guano, mixed with equal quantity of gypsum			200
6 ditto ditto ditto			207
4 ditto ditto ditto			252
2 tons of bones per acre			233
1½ ditto ditto			235
1 ditto ditto			240
8 cwt. of guano, pure			223
8 cwt. of gypsum, pure			185
TURNIPS.			
25 tons of farm-yard muck per acre, as above			455
8 cwt. of guano, mixed with equal quantity of gypsum			410
6 ditto ditto ditto			414
4 ditto ditto ditto			489
2 tons of bones			464
1½ ditto ..			482
1 ditto ..			370
8 cwt. of guano, pure			450
8 ditto gypsum, ditto			446
MANGEL WURZEL.			
25 tons of muck, as above			415
8 cwt. of guano, mixed with equal quantity of gypsum			483
6 ditto ditto ditto			424
4 ditto ditto ditto			395
2 tons of bones per acre			366
1½ ditto ditto			388
1 ditto ditto			339
8 cwt. of guano, pure			322
8 ditto of gypsum, pure			265

The 8 cwt. of guano, pure, had the advantage of the 8 cwt. of mixture, inasmuch as the drill on each side of it being short in the tops, the sun and air got more freely at the potato; the tops of those where the 8 cwt. of mixture had been applied were very tall ($6\frac{1}{2}$ feet), covering the ground closely, obstructing the air almost entirely.

No rotten potatoes where guano was laid, while after muck and bones there were a good many.

On turnips, much less mildew after guano than after other manures.

CAPESTHORNE, December 16, 1843.

GEORGE BROWN.

THE HISTORY OF THE INTRODUCTION OF THE SWEDISH TURNIP INTO BRITAIN.

By the Rev. THOMAS NEWCOME, Rector of Shenley, Hertfordshire.

[From the Gardener's Magazine.]

Our common friend, the Rev. J. Mitford, has recommended me to communicate to you what I consider to be the true history of the introduction of that valuable plant the Swedish turnip into this island.

It is now about fifty years since the late Sir David Kinloch of Gilmerton, near Edinburgh, gave some of the seed to my father, the Rev. Henry Newcome, vicar of Gresford, Denbighshire, and a near neighbour to Sir Forster Cunliffe of Acton Park, near Wrexham; who married a daughter of Sir David Kinloch. This latter baronet told my father that "a Swedish nobleman had given the seed to him." I well remember my father growing about half or three quarters of an acre of the seed, and selling it to the late Mr. Mason of Fleet-street, an eminent seedsman, for, I believe, the sum of £70; and this was the first seed sold in London.

Now, if you know a more authentic account of the introduction of the Swede turnip, you will, of course, not take any notice of, nor publish, this my account of the matter; but, though writing from mere impression and memory, I believe this is substantially the true one.

I have often heard my father declare that "he was the first to teach the people in North Wales to hoe their turnips;" and that he astonished the natives by ploughing up old furze or gorse roots with a Hertfordshire wheeled plough, imported from this parish to that of Gresford, near Chester. He was the first who ploughed in that county with two horses abreast; while, at that day, all the farmers ploughed their light gravelly soil with four horses at length!

SHENLEY, Herts., Sept 4, 1843.

NOTICES OF NEW PUBLICATIONS.

The Sporting Magazine to December. London: M. A. Pittman.

This ably-conducted periodical is as varied, pleasant, and original in its contents as we ever remember to have seen it. Besides the requisite Sporting Intelligence, there is an excellent paper entitled "Hints on

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Horse-dealers and Dealers in Horses," which the inexperienced in such matters might consult to advantage; "Fox-hunting in past and present Times" yielded us much gratification, and we should like to see Colonel Cook's advice to Masters of Hounds concerning their behaviour to farmers faithfully practised. He says "You should also endeavour to gain the goodwill of the *farmers*: if any respectable body of persons suffer from hunting, it is them; and I think it not only ungentlemanlike, but impolitic, to treat them in the field or elsewhere otherwise than with kindness and civility. They have a great deal in their power; and if once you gain their respect and esteem, whilst becoming popular amongst them in general, it will save you many a litter of foxes, and you will go on pleasantly without any grumbling."

An article on "Kennel Lameness" will be found worth a serious perusal; and "The Sportsman in Canada" and "Sporting Prospects in Devonshire" are of too lively a nature to be neglected. The following specimen of *disinterested* hospitality is from the "First week in November," and is worth reading—

"For lack of better amusement, we occasionally enjoy a little rabbit shooting above and under the cliffs in the vicinity of that extraordinary convulsion of nature, 'the Land Slip.' This is one of the lions of the neighbourhood, and attracts crowds of visitors during the summer months.

"The idle, the curious, and the *savans*, all flock to this spot; and the proprietor of the farm called Dowlands, through which the road leading to the chasm runs, is reaping a rich harvest. The farm-house is converted into a caravansery—a sort of traveller's rest—where refreshments are provided for man and horse. Mr. John Read, the provider of these creature comforts, seems determined to make hay while the sun shines, and never omits levying a tax on the tourist. He is what would be termed by the fancy a 'wide-awake chap,' and, with an eye to business, never loses sight of the benefit to be derived from the fallen cliffs near his property. In his professional visits to the neighbouring market-town in his own county, as well as Somerset and Dorset, he, as a matter of course, comes in contact with his brother farmers; and, as a matter of course also, he never fails to ask them to come and look at the wonderful Land Slip; and it is whispered that Mr. John Read has an ugly trick of asking the worthy yeomen to dinner, and making them pay for their fare afterwards. An amusing exemplification of this occurred not long ago: the fact is unquestioned, and I therefore give it.—At Chard fair, he met at the ordinary, after the business of the day was over, an

old acquaintance, a jolly Somersetshire farmer, whom he pressed to come and dine with him, and explore the wonders of the Land Slip, adding, 'bring your Missus with ye, and we'll have a jolly day of it.' Upon this hospitable invitation, the worthy farmer and family went to Dowlands, rambled about the cliffs, scrambled down to the beach, saw huge fragments of rock, an enormous fissure, and a yawning cavern; returned to the house of entertainment, ate their roasted pork, boiled fowls, bacon and greens, swigged their cider and ale, and wound up the feast by divers glasses of grog and a yard of clay. But mark the sequel. The *hospitable* landlord, as they were preparing to depart, left the room to see the horse put in the chay-cart, and during his absence the provident better-half brought in *the bill*, which amounted to something like five or six shillings a-head. But now the Somersetshire yeoman shall speak for himself:—'Dang the fellow! he ax'd Missus and I to come and dine wi 'un, and said he'd show us the Land Slip, and what d'ye think, he made us pay, and pretty smartish too I can tell ye, for our pork and greens, and when I got there I seed nought but a *d—d stone quarry* !!! But that be'ant all: as I was driving out of the yard, a'ter paying the bill, a young chap came running fit to break his neck, and said, 'I say, Measter, you ha'n't paid for the hay and oats.' So I'm d—d if he didn't make me pay for the horse's *carn* into the bargain' !!!"

The Engravings are excellent, and leave no room for even the fastidious to complain; and the utility of the Maps of the Hunts no one will question. To such of our country friends as do not take the work, we heartily recommend it, as it will be found to be a pleasant companion, well adapted to dispel the gloom that sometimes besets us, and to make our lighter moments still more cheerful.

The Veterinarian to December. London: Longman & Co.

It has ever been our wish to see the Veterinary Art occupy its legitimate position. The publication under notice gives us in no stinted measure the contributions of the followers of that profession; and the amount of talent displayed therein must assuredly win its way. We find Mr. Field very encouraging in his Introductory Lecture—

"If we take a retrospect of the veterinary art some fifty years ago, and compare the worse than Cimmerian darkness in which it was involved with the brighter and more wholesome atmosphere with which it is at

the present day surrounded ; if we mark how it has broken through the meshes of ignorance in which it was so long entangled, and how it now stands out in bold relief, acknowledged by the professors of human medicine as a sister art, I would ask, have we not just cause for encouragement ? It is, indeed, a subject for gratulation, and should serve to stimulate us on our onward course."

In our present Number will be found a paper on the Good and Bad Points of Cattle, and on the Formation of Fat and Muscle, which we extracted from the *Veterinarian*, and which we strongly recommend to the notice of our readers.

Experimental Researches, Chemical and Agricultural, showing Carbon to be a Compound Body, Made by Plants, and Decomposed by Putrefaction. By Robert Rigg, F.R.S. London : Smith, Elder & Co., 1844.

Liebig's investigations of the chemical processes of vegetable life, if they have not discovered the true principles of agriculture, have done more than the labours of any other investigator to excite and direct enquiry in the right direction. On every side eager enquiry is now at work, with the happiest prospect of establishing a code of laws for the agriculturist, which will enable him to exact from the soil the full measure of riches it is capable of yielding. The work before us is one of the number which the excitement caused by Liebig's report to the British Association has brought forth. The author, however, has diverged from the general track, and has endeavoured to establish a new theory ; but we cannot accord him the merit of success. Mr. Rigg's theory is, that carbon is a compound body made by plants, and he confirms it, as he supposes, by a series of experiments, which show "an unaccountable disappearance of carbon during putrefactive fermentation." But Mr. Rigg will not be allowed to assume that carbon is a compound, on the ground that he cannot account for its disappearance under the circumstances of his experiment. Failure of accounting for the loss is no proof of anything but the experimenter's want of skill in analysis. Mr. Rigg should have accounted for the carbon ; for, even if it were a compound, its elements must have been present, in some condition ; that is, supposing the loss not to have been a positive loss by escape.

Notwithstanding Mr. Rigg's failure to prove the position he has assumed, his book contains many interesting facts.

The Culture of the Grape-Vine and the Orange in Australia and New Zealand; comprising Historical Notices, Instructions for Planting and Cultivation, Accounts from Personal Observation of the Vineyards of France and the Rhine, together with Extracts, concerning all the most celebrated Wines, from the Work of M. Jullien. By George Sutton, F.L.S. Smith, Elder & Co., 1843.

This is a patriotic performance. The author has been long a resident in Australia, and one of the first and most successful planters in that interesting colony. It is his adopted country, and, of course, he is deeply interested in the improvement of all its natural advantages of soil and climate, and in the prosperity and happiness of its present and future settlers. Indeed, Mr. Sutton's book has been drawn up with a friendly view of benefiting the latter class, who may now have in contemplation a voyage to a colony where they would have scope for their industry, on a grant of land which they might call their own, and from which they might derive every necessary of life, while looking forward to ultimate independence.

Mr. S. many years since proceeded to Australia, under the advice and auspices of the late Sir Joseph Banks, to examine the vegetable productions and capabilities of the soil and climate, with a view to the introduction of the more valuable plants from other parts of the world, and new to Australia, and which might be useful to the colonists, either as necessities of life or as objects of commerce with the mother country. The author soon saw, that the fine temperate climate was well adapted for almost every European production, whether herbs, shrubs, or trees, or whether culinary or economical. Eatable tubers and corn were prerequisites; next, fruit of every useful kind. Among these last, the apple, pear, and plum, being culinary, were eligible introductions; but far superior to those just mentioned are the grape and orange, not only as articles of food, but for the exhilarating juice so easily obtained from the luscious grape. Hence, by due cultivation of the vine, wine would become an Australian beverage; and as a great redundancy of this precious and enviable article might every year be produced, Australia would soon become the vineyard of all Eastern Asia, with its surrounding innumerable islands. Nay, more; if Mr. Sutton's excellent advice be followed, the wines of Australia may even rival those of the Rhine and other European vineyards.

Mr. S. disclaims all idea of wishing to shine as an author; but says in his preface, "My claims to attention are founded upon an earnest zeal

for the welfare and prosperity of a community with whom, during a long residence, I have shared all the toils incident to new settlements, and may be supposed to have acquired a practical knowledge of the capabilities and wants of that fine country."

Every reader of his book will readily respond to this representation, and admire and be enlightened by the very plain practical directions set forth in his various statements relative to the principal objects which colonists should have in view, in accomplishing the grand result contemplated by the author, namely, to render Australia and New Zealand wine-exporting countries, instead of being, as now, importers of that indispensable article from the Cape of Good Hope or from Europe.

To show the practicability of such a result, Mr. S. adds, "I have had long experience in the culture of the vine and the orange, on my land near Paramatta. My first vineyard was planted in 1801; but more pressing duties prevented much progress until 1835, when I established my vineyard with success, and have produced a variety of wines, which justify all I have said in favour of a more general adoption of vine-culture as a profitable and healthy occupation. Other settlers have been equally successful, and good wines have been made of various descriptions; such as champagne, claret, Sauterne, Barsac, sherry, and other light wines."

Mr. S. next proceeds to notice the use of wine amongst the ancients, the history of the vine, observations on the capabilities of Australia and New Zealand for the cultivation of the grape, &c. Under this head the geographical position and the favourable soil and seasons of those countries are represented as being peculiarly well adapted for vine-culture. And it has been already discovered by Mr. S. and his brother colonists, that the dry slopes of hills produce higher flavoured grapes than the richer levels. This is exactly the case in respect of the vineyards of Europe: the highest flavoured fruit are produced on the hills which have the greatest share of sunshine. In all countries, every species of vegetable production in which high colours and exalted qualities are concentrated, are invariably found on the elevated spots of the general surface of the ground. In this country, a flock of sheep turned upon a piece of pasture will quickly show, by climbing to the topmost part, where the sweetest grass is found. The dwarfest crops of wheat, barley, and oats, yield the finest quality of flour, the greatest quantity of gluten, and the strongest spirit when distilled. The rank growing productions of the valley are always inferior. So it is with much of the Rhenish wine, made from imperfectly ripened

grapes, owing to want of sufficient sun in that northern latitude. It is the circumstance of Australia enjoying so large a share of ardent sunshine, when the grapes are ripening in that country, that induces the hope, that Australian wine, when the culture and best methods of manufacturing the juice are brought to perfection, will certainly be a source of great wealth to the settlers.

"The pioneers of colonization," continues Mr. S., "have succeeded in banishing the dreary aspects which instinctively led the settlers to husband their resources in necessary food and clothing. All apprehensions now being quieted, by the success of sheep-farming and agricultural pursuits, it would seem to be their next care to cherish those aids to health, happiness, and content, which their labours entitle them to enjoy. It is with the view of directing more earnest attention to this subject that the present little work is published. Those who regard the useful only, must admit the value of this branch of husbandry, when we reflect what a great source of wealth it proves to those countries where it is successfully pursued. France, Spain, Portugal, and Italy, have accumulated riches by their commerce in wine and the fruit of the vine, and a vast portion of the population of those countries are maintained thereby in habits of industry, contentment, and peace."

The establishment of a vineyard in Australia is no very difficult matter; not more, indeed, than making a plantation or holt of willows in England. When a well-sheltered side of a hill can be chosen, having a dry subsoil, under a surface stratum of loamy gravel, or sandy loam, twelve or fifteen inches in depth, more or less, let this be trenched to the depth of the staple, laying the surface smooth. The ground is then ready to receive the cuttings, or young plants. Either will do, only there is more certainty and time gained by the latter than the former. It is scarcely necessary to add, that the ground should be free from all root-weeds.

The cuttings should be made of the last year's shoots of old vines, soon as the leaves fall. This happens in that hemisphere in the month of June. Select shoots which are of a firm texture, and well ripened; cut them in the rough, of from fifteen to thirty inches in length; tie them in bundles of about fifty each, and place them in a trench, and nearly covered with earth till the middle of August, which is the season for planting. Prepare the cuttings for planting, by laying the bundles in water for one night: reduce each to about fifteen inches in length; pruning off all side shoots and remains of tendrils. The base of each cutting should be cut square off, close below a bud. They are then

inserted by line, with a dibber, about one foot deep, leaving three inches of the top above ground, furnished with at least two buds, whence the first branches will be produced. Mr. S. advises the holes round the cuttings to be filled with a little rich compost, and the cuttings to be securely fixed in the soil in rows four feet apart, and at intervals of three feet. Before the buds shoot, prop-stakes of the proposed height should be driven to each cutting, and to which the tender shoots must be carefully tied as they advance in height, and also at the same time be kept divested of side shoots and tendrils.

In this way our author planted and managed 2500 vines in 1835, and in two years after, each vine bore from four to ten bunches of grapes; and from this small vineyard wine was made in the fourth year. For further particulars we must refer to the book.

This is a striking proof of all Mr. Sutton's representations as to the suitableness of Australia and New Zealand being well adapted to the growth of the vine. Indeed, it gives a new and most important value to the colony; and if our author's views be carried out, may eventually be not only productive of the greatest benefit to the future generations of the colonists, but also to the mother country. As a branch of agriculture it deserves every attention; and if wine can be made to rank with wheat as a necessary of life, it would be a consummation devoutly to be wished.

There are other circumstances besides the introduction of vine-culture into Australia, mentioned by Mr. S., which makes this notice of his little volume particularly interesting to British farmers at this present time. British agriculture is now far from being prospectively in a steady and inviting condition; and the minds of many of those engaged in it are a prey to anxious forebodings and uncertainty as to what may be their fate in a few months or years. Consequently, every man of an enterprising turn of mind, is looking about him to find a suitable field for the exercise of his skill and laborious exertions, and which, at the same time, holds out a rational hope of ultimate success. Such inquirers should read Mr. S.'s book; for in it may be seen that Australia is a country in which every tack of British farming is practicable, and equally, if not more, successful. On this head, we cannot have better testimony than that of Mr. S., who is himself a living witness of the truth of all he propounds for others, and a happy exemplar of a successful struggle in a strange land. He has traced the path and smoothed the road for his followers, and many, no doubt, will avail themselves of his advice.

And it is not only to master settlers that Mr. S. offers advice. He says that Australia is also an excellent market for labour of every description, and where there is constant employment for thousands of British subjects who have neither work nor bread. It is a pity, indeed, that such colonies as Australia do not withdraw more of our surplus population than they do. Our emigration societies are either badly planned or badly managed; otherwise the advantages presented by the countries above alluded to would not be half lost from a dearth of labourers. M.

BUFFALO GRASS.

In a communication in the "National Intelligencer," from Captain Cook of the United States' Dragoons, to F. Markoe, corresponding secretary to the National Institute, buffalo grass is thus described—

"It flourishes on a poor, thin soil, in an arid climate, 'is of a pale green, and falling, it takes a slight root on the joints of the stock; these joints are eight or ten in number, and four or five inches apart. This peculiarity is only observed on a close inspection, for, the joints also sending up a short stem, on which is found the grain and slender blades, it resembles an unthrifty blue grass; and, like that, it forms a sod, and a smoother and far harder one. About harvest time the country turns to the yellowish brown colour of our ripe grain fields; and in extensive views the eye is only relieved by the green of a single variety of spiceweed, which dots the smooth brown surface of the earth. Thus, so short and very withered in appearance, it seems wholly insufficient to support animal life, while proving with its grain a rich and ample food for countless buffaloes; and also for the diminutive but far more numerous prairie-dogs. Some say the grass will only grow where the buffalo is found; that it disappears as they recede. For a hundred miles we see it almost continually in the road, when little or none other is to be found. If this goes to prove that trampling is essential to its growth, the above idea is strengthened by our knowledge that the immense herds of buffaloes must subject it fully to this treatment. I think I nowhere saw the grass in quantity ungrazed by the buffalo; in the lower river bottoms, amid the succulent, green, rich looking grass of several species, *untouched* by the buffalo, little patches of this were observed closely eaten. After the last winter and spring of unheard-of severity and backwardness, we found the buffaloes quite fat on the 13th of June.

"Our dragoon horses had to subsist for some time on this grass; their being able to do so at all, so closely grazed as we found it, and under the necessary restriction of a 22-foot picket rope, would seem to prove its extraordinary nutrition. Only one other fact will I mention, and I do not explain it. I found it on my return, near Council Grove, about the middle of July, in the road, taller and greener than almost any I had seen earlier and further to the west. I shall send you, by the first opportunity, half a pint of the grain, which I picked with my own fingers: it can be gathered in no other way."

OBITUARY.

GEORGE WEBB HALL, Esq.—With deep regret we have to announce the death of George Webb Hall, Esq., of Sneed Park, near Bristol, who, in the prime of his days, and in the midst of his useful labours, it has pleased the All-wise Disposer of events to remove from this earthly scene.

Few men of his standing have done more to deserve the esteem of his fellow-men while living, or will be more deeply regretted now that he is gone from amongst us. Kind-hearted, affectionate, and active in his exertions in the great cause of Agricultural Improvement; particularly, as it ministered to the comfort and well-being of his humbler brethren of the soil, his memory will ever be associated with all that was good, useful, and amiable.

Mr. Hall succeeded his father in the occupation of a fine tract of land at Sneed Park, abutting on, and within view of, the beautiful valley of the Avon. Mr. Hall, senior, died in April, 1824, from lock-jaw, in consequence of a fall from his horse; the subject of the present notice being then in his 28th year. From the period of his entry into public life he appears to have formed the resolution to live a life of active usefulness—and he carried his resolution into effect; for Mr. Hall was not a man to put his light under a bushel—motives far higher than those of ostentation or the love of applause actuated him on all occasions. Gifted with talents, if not first-rate, at least of a very respectable order, and with no common share of perseverance in whatever he conceived to be the path of duty, he never shrank either in public or in private from the performance of that duty. His honesty and singleness of purpose always gained for him the applause and good opinion even of those with whom he differed; and the earnestness with which he was in the habit of enforcing his views of the amelioration of his fellow-man, was invariably appreciated by all who had the oppor-

tunity of hearing the addresses he was generally called on to deliver at the meetings of the Royal and other Agricultural Societies.

In this (the Royal) Society he ever took a lively interest, and our last interview with him was on the ploughing ground at Derby, in July, where he was superintending an improvement he had made in the sub-soil plough.

Mr. Hall was well versed both in the theory and practice of Agriculture, and his writings on the subject were distributed over the different magazines and periodicals of the day. His pamphlets on "The Connexion between Landlord and Tenant and Tenant and Labourer," are fair specimens of his zeal, in what he considered to be the cause of improvement. The second part, especially, is interesting to all Norfolk farmers, as detailing at considerable length the experience of that best of landlords, the late Thomas William Coke, Earl of Leicester, a visit to whom, in 1841, enabled Mr. Hall, by a personal inspection of the system pursued at Holkham, to make himself acquainted therewith: and few of the many visitors at that noble mansion have derived greater pleasure from, or could more highly appreciate the advantages of such a visit. From his own lips we heard these expressions of his admiration, and they are the more deeply impressed upon our mind as being uttered in the last conversation we were fated to have with him.

It is no part either of our duty or our purpose to institute any comparison between Mr. Hall and his late lamented father. But thus much we may say, that whatever similarity might have originally existed in their views as to the Corn question, the all-absorbing topic which engaged the unwearied attention of the father during the last ten years of his life, whatever similarity of opinion, we say, might once have existed between them, certain it is, the sentiments of the son had undergone a material change, and may have been said to approximate very closely to free-trade principles. Instead of a high protecting duty (the *Alpha* and *Omega* of his father's exertions to obtain) he hesitated not to advocate a low duty, and that not fixed, but gradually melting away by a shilling per quarter in each year, till it should be reduced to nothing, and the trade thrown open between England and the world.

This is neither the time nor the place to offer any remarks on a point, respecting which so much difference of opinion exists. Right or wrong, Mr. Hall's sentiments always met with respect, because they were honest, upright, and thoroughly disinterested. We fear his loss will be heavily felt by his family, as assuredly it will be by the public at large.

JOHN CLAUDIUS LOUDON, Esq.—The labours of this active and eminently useful man in his day and generation were brought to a final close on Thursday, the 14th December, 1843, at his residence in Bayswater, near London. The hand of death arrested him in the midst of exertions, both mental and bodily, to free himself and his family from the weight of certain pecuniary obligations incidental to the publication of his great work, the "*Arboretum Britannicum*," for the particulars of which we must refer the reader to the article under that head, in another part of the Magazine. We are willing to hope, that the sad event we now record will rather serve to stimulate than retard the kind efforts of friends to complete what he had so much at heart. This is due alike to his memory, and to the great exertions of Mrs. Loudon; a worthy partner of so great and excellent a man. Ever active in the cause of science, and never so well pleased as when ministering to the comforts and general welfare of his fellow-men, let it not be said, that his labours for the public were rewarded with public ingratitude. We are induced to speak out on this occasion, because it is our solemn duty so to do. We feel strongly the sacred obligations under which, as a part of the public, we are placed by Mr. Loudon's exertions in our behoof. Let us neither be slow nor lukewarm in doing our utmost to repay those obligations—not to the dead, but to the living.

A word or two on his general character must close this hasty and imperfect sketch. No man of his acquirements ever possessed a humbler opinion of his own deserts. In this respect he much resembled the late Sir James Smith, except that to the botanical knowledge of the latter, he added a perfectly marvellous fund of information on a variety of other topics of general importance. In proof of this, we have but to glance at his various encyclopædias—of "*Gardening*," of "*Agriculture*," of "*Architecture*," of "*Plants*,"—his "*Hortus Britannicus*,"—and last, but not least, the noble work alluded to in the former part of this article, the "*Arboretum Britannicum*," in itself sufficient occupation for any ordinary life to complete.

Besides the standard books above-mentioned, a variety of others of a minor character will attest his wonderful perseverance and unwearied industry. As an editor, nothing could exceed his good temper or strict impartiality, and his general urbanity and liberality were the admiration of all who were fortunate enough to have made his acquaintance.

Poor Loudon ! many a happy—we are willing to hope, many an improving hour has it been our lot to pass in thy society. Peace to thy gentle spirit ! Few—very few hast thou left thine equals in this rough and stony-hearted world of ours.

T.

ARUNDEL CHRISTMAS CATTLE SHOW.

The annual show of fat stock took place on Tuesday, the 12th December. There was a large quantity of stock, and generally speaking it was of very good quality. A pair of 3 years old Devon heifers of the Duke of Norfolk's were the admiration of every beholder. They were purchased by Mr. Lowe, of Brighton. The market was tolerably brisk. About two o'clock a party of about 150 sat down to dinner at the Norfolk Arms Inn ; his Grace the Duke of Norfolk presided on the occasion, and the vice-chair was filled by Captain Pechell.

The usual loyal toasts having been drunk, the noble chairman proceeded to give the awards of prizes :—

Cattle—Best fat ox, 5 years old and upwards, £10, Mr. G. Boniface, Ford—Fat Sussex ox, 5 years old and upwards, fed on succulent food only, £10, Mr. R. Coote, Climping—Fat Sussex steer, under 5 years old, fed on succulent food only, £10, Mr. G. Penfold, Wiggonholt—Fat steer, under 5 years old, £10, Mr. Challen, Hardham—Fat Welch runt, £7, Mr. G. Drewitt, Walberton—Fat Welch runt, fed on succulent food only, £7, Mr. W. Duke, Leominster—Fat cow, 5 years old or upwards, bred in Sussex, £7, Mr. R. Challen ; given to Mr. T. Duke, Wick—Fat open heifer, under 5 years old, £7, Mr. R. Challen ; next to Mr. Duke, but withheld—Fat open heifer, under 5 years old, fed on succulent food only, £5, Mr. R. Challen ; given to Mr. S. Henty, Kingston—Three 4-tooth fat wether sheep of description, the Duke of Norfolk, but not taken in, £5, Mr. W. Duke, Leominster—Three fat 4-tooth wether sheep, fed on succulent food only, £5, Mr. W. Duke ; given to Mr. G. Coote, Tortington—Three fat 2-tooth Southdown wether sheep, £5, Mr. J. Coote, Yapton—Three fat Southdown 2-tooth wether sheep, fed on succulent food only, £5, Mr. J. Duke, Courtwick—Three fat ewes of any description, £5, Mr. G. Coote ; given to Mr. H. Upton, of Binstead—Three fat Southdown ewes, £5, Mr. T. Sonter, Tortington—Fat pig of any breed, under 1 year old, £2, Mr. J. Field, Arundel—Second best ditto, £1, Mr. S. Knowles, Warningcamp.

Corn—Five sacks of white wheat, grown by himself, £3, Mr. R. Drewitt, of Peppering, weight 63½ lbs. ; second best £2, Mr. T. Duke, Wick, weight 61½ lbs. —5 sacks of mixed wheat, grown by himself, £3, Messrs. J. and T. Coote, Walberton, weight 61½ lbs. ; second best, £2, Mr. H. Upton, Binstead, weight 61½ lbs. —5 sacks of red or brown wheat, grown by himself, £3, Mr. H. Salter, Arundel,

weight 60½ lbs.—5 sacks of barley of any description, grown by himself, £2, Mr. R. Drewitt, Peppering, weight 51½ lbs.; second best, £1, Mr. Coote, Walberton, weight 50½ lbs.—5 sacks of oats of any description, grown by himself, £2, Mr. G. Drewitt of Peppering, weight 39½ lbs.; second best, £1, Mr. G. Bleinden, Polling, weight 39½ lbs.

Roots—Best samples of not less than six Swede turnips, 30s., Mr. Hide, Littlehampton, weight 9 lbs. each; second, £1, Mr. H. Salter, Arundel, weight, about 4 lbs. each—Six turnips of any other class, 30s., Mr. H. Salter, Arundel, weight, 4½ lbs.; second £1, Mr. R. Drewitt, weight, 4½ lbs.—Not less than six roots of mangel wurzel, 30s., Mr. S. Duke, Blakehurst, weight, 87½ lbs.; second, £1, Mr. G. Drewitt, Walberton, weight, 75½ lbs.—Not less than four gallons of potatoes, 30s., Mr. Knowles, Warningcamp; second, £1, G. Hodson, labourer to Mr. H. Upton, Binstead.

“The Judges—Messrs. Harmer, Gaines, and Cheasmore”—was then proposed by his grace, with many thanks to them for their arduous duty. Mr. Gaines returned thanks. “The Successful Candidates” was next given. The Duke of Richmond then proposed “The Duke of Norfolk, their President.”

The noble President on rising was greeted with a round of applause. His noble friend had called him the friend of agriculture. He certainly felt it his duty to do all he could for its prosperity, and to relieve the poor and distressed labourer to whom they owed so much. He was afraid they would get tired of him, but he could not help adverting to the corn and root show to-day. This was their first year, and he thought such shows would be productive of much good. He had in his hand a root of mangel wurzel, grown in 1842; he would pass it down the room, and if any gentleman would cut it he would find it as sound and sweet as that grown during the present year.

Mr. Walkins having inquired whether the sample produced was red or yellow,

Mr. Miscat, the producer, replied, yellow, and he found, from experience, that the yellow, though not giving quite the weight of the red, had in it more saccharine matter, and consequently imparted greater support. Some of the prize cattle shown that day, had been fed upon this root of last year up to the beginning of September, and he considered the longer it was kept the better was the quality. The noble president's father, the late Duke of Norfolk, had first turned his attention to the growth of mangel wurzel; Mr. Coke, the late Lord Leicester, had also tried it at Holkham, but afterwards abandoned it; but the Duke of Norfolk persevered, and he thought there was not a farmer round but what grew either his 30 acres, or his one or two, according

to his quantity of land. He considered this root a very valuable one; he thought, with proper attention, it might be made to produce 25 tons per acre; and all that was required to keep it was, due attention to its stacking. The way in which he did his was, to have them carefully raised in dry weather, some straw put about them, and then carefully covered with about six inches of earth, as it was necessary to keep them from the frost. In the spring he usually moved the heap, put fresh straw, and a smaller coating of earth, and he found this method preserved them very well.

"The Judges of the Corn and Roots" (Messrs. Silverlock, New, and Marshall) being drunk, Mr. New returned thanks on behalf of himself and his colleagues.

The noble chairman then gave "The Farmers' Friend, his Grace the Duke of Richmond." The toast was received with great applause. The Duke of Richmond returned thanks; and the noble chairman next gave "The health of the Vice-president."

Capt. Pechell, after adverting to his inexperience as a practical farmer, and the ill-success he had had as a competitor in the root show of that day, proceeded to show, from observations he had made, the great advantages of draining. He did not, he continued to say, preach without practising, for he had furnished his tenants in Oxfordshire with 270,000 draining tiles, at an expense of from £2 5s. to £8 6s. per 1000; but this was nothing compared with what Lord Darly and his father had done, as stated at a meeting the other day, having expended between £500 and £600 in purchasing upwards of three millions of tiles. And what was the result of such practice? Why, land not worth 5s per acre before draining, was now worth 15s. But then the landlord and tenant must understand each other. It was so with his tenantry, than whom a more respectable and highly independent body of men could not be found. The gallant captain then adverted to the subject of leases; he knew there was a great want of confidence as to the fixity of tenure, and the right of the elective franchise, and what he would advise every landlord to do, would be to send for his steward, not his lawyer—(a laugh,)—and in a few short intelligible and English sentences, protect both parties. He recommended them to get rid of hedge rows, timber trees, and crooked fences; not to use three or four horses to the plough, when two would do; to attend to drainage and the culture of carrots and flax.

Captain Pechell again rose for the purpose of proposing a toast. There was one nobleman to whom the friends of agriculture were much

indebted. Lord Althorp had been among the first promoters of agriculture; he was one who, in the first stages of the Royal Agricultural Society, took much interest in its formation. He would, therefore, do himself the honour of proposing Lord Spencer; he knew no man in Great Britain who, for high honour and integrity, could compete with him (cheers and hisses). He partook of the highest honour and integrity, and he would, therefore, give "Earl Spencer, the President of the Royal Agricultural Society of England." (Applause and disapprobation.)

A great number of gentlemen refused this toast, and kept their seats. Mr. Breech, who rose to give the hips, was greeted with hisses, and "Get down," and the three times three was intermingled with loud hisses and ironical cheers.

"The Members of the County" having been given,

His Grace the Duke of Richmond returned thanks on the part of his son, the Earl of March, and his colleague. He (the noble duke) knew his opinions were right, and that he was thoroughly independent, feeling at the same time that other men had a right to be independent too (great applause). He could not help feeling that the gallant captain had steered rather too near the wind (applause.) He knew well the noble individual whose health Captain Pechell had proposed, he had known him for many years—had respected him for his many virtues, and there was no gentleman he would sooner see at his table as a private individual than Lord Spencer. He was a good farmer, an excellent breeder of short-horns, in fact, one of the best in the country, and it was in this light, and this only that he (the noble duke) rose when his health was proposed (hear, hear); had it been from any other view he certainly would not (tremendous cheering). He knew him (Lord Spencer) as a good farmer, but he was not bound to look upon him in any other light. He had thought it right to guard himself on this subject; he did not wish to steer so near the wind as the gallant captain had done (hear, hear), but he would state that he hoped his son would still continue to hold the opinions which he now did.

After several other toasts had been given, the meeting separated.

HINTS FOR THE MANAGEMENT OF HENS.

[From the American Agriculturist.]

The hen is peculiarly an egg-producing bird. She has the same pre-disposition for laying, that the cow has for secreting milk. Some breeds are better adapted for this object than others; but in all that have ever come within our notice, the proper food and circumstances are alone wanting to produce a reasonable quantity of eggs. What are these requisites? Let us first inquire what it is we wish to procure, and the answer will enlighten us materially as to our first queries.

The egg consists of three distinct parts; the shell, the white, and the yolk. A good-sized egg will weigh 1000 grains, of which about 107 are shell, 604 are white, and 289 are yolk. Of the shell, 97 per cent is carbonate of lime, 1 per cent phosphate of lime and magnesia, and 2 per cent albumen. The white consists of 12 per cent of albumen, 2·7 of mucus, 0·3 of salts, and 85 of water. The yolk has about 17·4 per cent of albumen, 28·6 of yellow oil, 54 of water, with a trace of sulphur and phosphorus. The above are the constituents of eggs, which have been formed when the bird has free access to the various articles which constitute her natural food. But they vary with circumstances. When full fed and denied all access to lime, she will form an egg without the shell, and deliver it enclosed in the membrane or sack which always surrounds the white when covered by the shell. When scantily fed, they will frequently lay; but from a deficiency of nutriment, the egg will be meagre and watery, and possess but a small portion of the nutritious qualities peculiar to them. To produce the largest number of good eggs on the least quantity of food, several things are requisite, the first of which is *an abundance of the right kind of food*. This is most readily obtained in part from animal food. In warm weather, when they have a free range, they can generally supply their wants in the abundance of insects, earth worms, and other animal matters within their reach. How greedy do they show themselves of everything of an animal character. There is nothing scarcely of this nature they refuse, and so ravenous are they for this species of food that I have seen them fasten to the entrails of a slaughtered pig, a part of which they had swallowed, and were unable to separate it from the adhering mass; and who that has been familiar with rural scenes, has not often observed them in summer, with a snake 15 or 18 inches long squirming in their beak, or an unlucky toad, as large as one of their own eggs, dangling at leg's length in their

bill, a prey to their carnivorous propensities. The large proportion of albumen contained in their eggs, requires that much of their food should be highly nitrogenized, and when they can not procure this in animal matter, it must be given in grains containing it. Indian corn has but a very small proportion, yielding only about .19 per cent of nitrogen. Oats have a much larger proportion, affording 2.2 per cent, being more than eleven times as much as corn, pound for pound. Wheat has from 2 to $3\frac{1}{2}$ per cent. Barley affords more than corn, but much less than oats. Many of the vegetables yield nitrogen in small quantities, such as potatoes, which, when boiled, are a favourite, and perhaps an economical food for hens. But after supplying them with a due proportion of animal food, which, under favourable circumstances, they will procure for themselves when enjoying a good range in summer, the most economical food is oats. When wheat is grown on the premises, it is probable that it is the next most economical, the much larger quantity of nitrogen contained in it, being more than a compensation for its increased price.

Hens will do much better to have a free range, as their instinct enables them to select food precisely adapted to their wants; and the exercise and rolling in the dirt are essential to their health. If confinement is necessary, in addition to the food above, they must be furnished with plenty of clean water, gravel, and lime. Gravel is necessary to grind their food, and without lime they can not form their shells; for though a small portion exists in all grains, it is not in sufficient quantity to afford the amount required for the formation of the shell. A small amount of sulphur and phosphorus is found in the egg, but this exists to a sufficient extent in their ordinary food, nearly all substances yielding a portion of each. In winter, hens should be kept warm, or they will not lay to any extent. If surrounded with a comfortable temperature, with the addition of the food above indicated, they will lay nearly all the time.

There is great economy in keeping hens where there are suitable conveniences for them; for if furnished with plenty of proper food and a warm room, even in winter they will produce two or three times the value of their food in eggs, as they command a larger price at that time. At all other seasons when they run about, they select for themselves nearly all the food they consume, which would otherwise be of no use to their owner; nay, frequently its consumption is of positive benefit to him. Such are all insects, grubs, worms, and their larvae, and any animal or vegetable food scattered around the premises, that would otherwise become putrid, and taint the atmosphere.

If to the usual qualities of hens, a breed of peculiar elegance, of graceful forms, and beautiful plumage, be added, together with entire adaptation to the economical purpose required, good layers and good carcase, we have a combination of utility, luxury, and taste in this bird, which should commend them as general favourites.

I will add a fact, which is not known, except, perhaps, to some peculiarly discriminating and highly-cultivated palates, that in addition to their stronger claims on the score of beauty, the flesh of the yellow-legged is much richer, and more highly flavoured, than either the white or the black-legged hens.

R. L. ALLEN.

BUFFALO, October 12, 1843.

MUSEUM OF ECONOMIC AGRICULTURE.

SIR,

I understand there is in London an institution under the name of the Museum of Economic Geology, which promises to be one of much national utility and interest, as it will be subservient to giving the public an insight into the results of science, in its application to the extraction of the treasures which Providence has laid up in the rich store-houses of the interior of the earth. I am induced to ask, could not a museum of economic agriculture be established that would be of equal public interest and utility, as the latter would have to do with things above, which would include a range of objects, not fewer in number, nor less interesting than those below the earth? in fact, the two institutions would seem to be twin brothers. The geologist may arrange for exhibition his specimens of granite from Aberdeen, Dartmoor, and other places; but cannot the agriculturist do the same with specimens of the green turf that covers our fertile valleys, on which our oxen and sheep are grazed? The geologist may arrange specimens of the produce of his mines; but cannot the agriculturist display his wheat, barley, and oats? The geologist may exhibit machinery and models of machinery used in working the mines, and cannot the agriculturist exhibit the machinery that is used for accomplishing various operations necessary for producing food for man? It appears, that premises in Craig's Court, Charing Cross, answer the purposes of the geologists; but that would not be exactly the place for an economic agricultural museum, as it would be more suitably placed among woods, brooks, and green fields, in the neighbourhood of London. And were it attached

to an experimental farm, it might perhaps contribute to produce other public advantages worthy of the patronage of the Commissioners of Her Majesty's Woods and Forests, as well as the Museum of Economic Geology.—I am, Sir, your obedient servant, C. W.

NEWCASTLE, Bridgend,
December, 1843.

["If attached to an experimental farm"? Why, yes. In this suggestion we heartily agree with our respected correspondent, and most readily do we give publicity to his suggestion. An experimental farm is an agricultural museum of itself, or contains all the essential elements thereof; and we see no reason why the bowels of the earth should be turned inside out, and those parts nearer the surface passed by unnoticed and unheeded. The farmer has as much, if not as *deep* an interest in the clay, chalk, peat, or other material which lies beneath the surface, as the collier or the miner has in the coal, ironstone, or fire-clay, beneath his mineral ground.—EDITOR.]

HAILSHAM FAT STOCK SHOW.

On Wednesday, 13th December, 1843, the above Christmas Cattle Show and Market was held as usual. Of late years the Sussex stock has been advancing in public esteem, and we were therefore prepared for an increase of it in its native province, which is the neighbourhood of Hailsham; but we were certainly wholly unprepared to witness so large or so fine a number of beasts as we did on this occasion, many of which would have done credit to any exhibition in England. There were 435 head of cattle, all of which were of the Sussex breed. The market was well supplied with horses by Mr. Thompson, of Wadhurst. The fat stock show was equally good with the market.

The judges were Mr. R. Wood, Laughton; Mr. Delves, of Tunbridge Wells; and Mr. Noakes, of Mayfield; and they completed their labours soon after two o'clock, when about thirty gentlemen retired to the George Inn, and sat down to a well-supplied dinner. George Darby Esq., M.P., took the chair. The following award of the judges was read:—

Fat Sussex ox, 5 years old and upwards, £5, Mr. J. Shoosmith, Folkington; second best, £3, Mr. W. Arkcoll, Westham. Fat Sussex ox, 5 years old and upwards, bred in Sussex, fed on grass, hay, turnips, mangel wurzel, or potatoes, £5, Mr. W. Arkcoll;

second best, £3, Mr. A. Denman, Willingdon. Fat Sussex steer, under 4 years old, £3, Mr. J. Shoosmith; second best, £2, Mr. A. Denman. Fat Sussex cow, 4 years old and upwards, £3, Mr. J. Shoosmith; second best, £2, Mr. Denman. Fat Sussex open heifer, under 4 years old, £3, Mr. J. Shoosmith; second best, £2, Mr. C. Ade, Willingdon. Five fat southdown wethers, 32 months old, £3, Mr. R. Breton, Westham, bred by Mr. Gorringe, Tilton. Five fat southdown wethers, 20 months old, £3, Mr. W. Arkcoll; second best, £2, Mr. R. Breton, bred by Mr. Gorringe.

All the prize animals were bred by the competitors, except in the cases where the breeder is named.

The chairman gave "The Judges," with three times three. Mr. R. Wood acknowledged the honour, and said it had been very difficult in some cases to decide which were entitled to the first prizes.

The chairman then proposed "The health of H. B. Curteis, Esq., M.P."

Mr. Curteis said he had met their worthy chairman at Rye, when they touched closely upon politics; but he did not consider that at such a meeting as the present one, if they avoided party politics, and discussed subjects without creating uncomfortable feelings, that there could be any objection to it. He did not think they differed much upon the necessity there was for agricultural protection, but they might differ as to the amount. He believed, that to prevent alteration and ensure permanency in that protection, it was essential to have a fixed duty; and if that had been conceded some time ago, the clamour now raised for total repeal would not have been raised by what you call the League—(Mr. Darby—I am not acquainted with them: cheers)—Anti-Corn-law League. These parties said they had made great progress in this county. He supposed they had made some; at all events people had begun to think for themselves. At Rye he had urged the farmers to consider this question impartially, and to be governed by sound reason. For himself, he would give no pledge as to the course he should deem it necessary to take, or the amount of protection he would advocate. He had been somewhat misrepresented by one of the local newspapers, about what he had stated respecting leases. He did not say he was opposed to granting leases. What he did say was, that in the present unsettled state of the corn-laws, it would be unfair to grant leases, both for landlord and tenant; and he considered both the London and provincial press which advocated them very much in error. Their chairman, in a conversation he had with him, said, that if he were a betting man, he would lay £100 to £1, that the corn-laws would undergo no change in this parliament; but it would not surprise him (Mr. C.) if the ministers, yielding to expediency, were to bring forward a fixed duty; and he said this without

wishing at all to speak in disparagement of the present government, for upon this question he was no party man, nor had he been, when filling a public situation differing from that he now held. Looking at probable events, he could not shut his eyes to the fact, that whether they liked it or not, they would be beaten out of the sliding scale. He was for a fixed duty. Formerly he was for a 10s. duty, which he supposed was even more than any one in the present company would now expect to obtain (no no). Well, he only wished they might get it. He should say 10s. was extraordinary good terms, and he feared the time was gone by for that. He knew their worthy chairman was of opinion, that in times of high prices the 10s. could not be maintained; but power might be given to the Queen in council, that when prices reached a certain point, corn should be admitted duty free (a voice—"Who would put it on again?") He knew nothing of whigs or tories in this question. He wished all to look well ahead; for he must admit, all his previously formed views were much staggered when he found so well known an agriculturist as Earl Spencer, the president of the English Agricultural Society, one of the first breeders of cattle, one whose property was invested in agriculture, declaring the opinion, that for the benefit of the farmer it was essential that all protection should be removed. Mr. Curteis, after passing a well-merited eulogium upon Mr. Darby and Mr. Fuller, gave as a toast, "The health of the members for East Sussex." The toast was drunk with three times three and one cheer more.

While Mr. Curteis was delivering his speech, the room received an accession of company, and there was an evident struggle among many to restrain the feelings of disapprobation raised by many of the sentiments he expressed.

Mr. Darby after thanking the company for the reception they had given to the toast, congratulated them upon the excellent show which they had had. He had ever thought this place was well adapted for such a show, and to that end had given it every assistance, and he trusted what had been seen to-day augured well for its future prosperity, but unless they obtained a general subscription, he much doubted its permanency—for to depend upon a few for the amount of prizes was very unsatisfactory. He considered it his duty, as their representative, to attend all shows of this character, and he regretted his unavoidable absence at Lewes. He was glad to see Mr. Curteis here to-day, who had stated his views so temperately, that although he considered these meetings not the best for the discussion of political questions, yet for the cause mentioned he had not interrupted him. He was himself at

all times ready to discuss the corn-laws, but he was willing to let the views of Mr. Curteis remain where they were, rather than bring forward his own in contradiction at the present meeting, but he was in the hands of the company. If they wished it he would state his opinions on this subject (Mr. Curteis—"Go on.") He had no middle course to take respecting the corn-law question. This agitation for the repeal of the corn-laws would not cease but with the abolition of all protection. If, therefore, the tenants waited for leases until the corn-law was settled, they must wait until there was no law at all—and then it would be of no use to take leases or land. With respect to a fixed duty of 10s., that had been long given up by Lord J. Russell, who admitted he could not keep it in times of scarcity; and then who, when it was once taken off—it was asked in the House of Commons—who would put it on? The opening of the ports by the means suggested would open a field for speculation; for who was to regulate the quantity to be admitted? Speculators might make fortunes while the country was being ruined. He maintained 10s. was not enough protection at the present moment, and would be more than sufficient at other times. If we had a fixed duty of 10s., now there would be an abundance of corn imported. Mr. Curteis admitted that if the price rose to 80s., the duty could not be maintained, and that he would take it off by an order in council. Mr. Curteis was rather behind here; for the order in council had been given up by Lord John Russell, who proposed to substitute for it an ascending scale up to 75s. He (Mr. D.) said that there were times when a duty could not be maintained. Neither a duty of 10s. nor 5s. could be maintained at 80s.; and then, when the price was low, a fixed duty was of no use at all; but what he wanted was to keep out foreign corn when we could produce sufficient, and to admit it as freely as possible when the need for it existed in the country. The hon. gentleman then went into the full details of the working of the present corn-laws; and the advantage of the rests in ensuring steadiness of prices. Whether the present corn-laws could be maintained or not, he would not say; but the way to maintain them was not for the agriculturists to say they could not be maintained. When the present scale of duty was fixed, he and others wished the duties to be higher; but there was this difficulty in the old scale, that the jumping part of it was so placed as to encourage speculation, without any benefit to the consumer, and to promote importation towards harvest. As to making the corn-laws permanent by a fixed duty, his solemn conviction was, that it was a complete chimera, and that the first day they had a fixed duty, the doom of all duties

was sealed. He could not understand why the agriculturists were to be told that they had no right to protection. With a population living upon wheat as the staple commodity, if they threw land out of cultivation by withdrawing protection, that moment they would find corn higher than ever it was before; and who was to benefit by it? On the other hand, if they give sufficient protection to induce the employment of capital on land, they gave employment to the labourers, and promoted a supply of corn for the country. He did not wish to see corn run up to an unnatural price; but the agriculturists of this county were ready to supply the country at the lowest possible price which would remunerate the grower, and which was all they had a right to ask, and the more they could equalize the price by a corn-law, the better would that corn-law be. Lord Spencer had been quoted as an authority, and he (Mr. Darby) always remembered him as a free-trader, he was an extensive grazier, and therefore was no great authority upon a question connected with the growers of wheat. With respect to the Anti-Corn-law League, he had never presided over their meeting, nor ever expressed a wish to do so, but declined even attending it, for, before he attended, he wanted to know who called it. What right had Mr. Cobden to come into Sussex and call upon the freeholders to meet him? He was apprised of their meeting indirectly, but he was not at the call of these gentry, but of his constituents—in whose service he was then discharging his parliamentary duty. He (Mr. Darby) had no apprehension of the corn-laws being altered this parliament; and the principal reason which led him to that opinion was the passing of the Canada Corn Bill; for that transaction would be the greatest possible fraud, if the government intended again to alter the corn-laws. If corn was not to be protected, neither should hops, nor anything else. All interests must sink or swim together; but if free-trade was introduced, there would be no “swim” at all—it would be all “sink.” What then were they to do? *Stand firm.* Let them not create another panic; but stand as long as they could. If they continued saying that such a thing would take place, till they really believed it, they were only putting weapons into the hands of others for their own destruction. Again he would say, stand firm. He had no middle course to offer them.

Mr. Darby's reply to Mr. Curteis was received with long and continued applause.

The chairman then gave “The successful candidates,” “The stewards,” “The secretary,” and several other toasts.

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